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PLAN OF DEVELOPMENT

of

Ministry of Land, Irrigation and Power

1966—1970

*Published by the Ministry of Planning and
Economic Affairs*

August, 1966

PREPARED BY THE MINISTRY OF LAND, IRRIGATION AND POWER

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PREFACE

IN this publication, the Ministry of Land, Irrigation and Power has presented proposals for a Five Year Programme of Development covering the activities of the different Departments under it. In January this year the Ministry of Agriculture and Food published its development proposals. While the proposals of the Ministry of Agriculture and Food placed the emphasis on the intensification of production and the increase of productivity, the investments proposed for the Ministry of Land, Irrigation and Power concentrate on new settlements, the development of new land and the extension of production. Both programmes are complementary efforts at achieving rapid import substitution and a high level of productivity in the agricultural sector as a whole.

The draft proposals submitted by the Ministry of Land, Irrigation and Power envisage, among other programmes, the drainage and reclamation of extensive tracts of low-lying land, the provision of lift irrigation for the cultivation of subsidiary food crops, the settlement of educated youths in agricultural schemes, the extension of export crops through peasant colonisation and youth settlements, and a significant increase in the tempo of work in land development and irrigation projects. The plans that are contained in the publication, however, are not final ; these have to be revised and adjusted both in their content and their scale of investment in relation to the overall development goals as well as the resources available for allocation.

These programmes are now being reviewed and evaluated for incorporation into the national plan. The appraisal of these plans should provide new perspectives to some of the proposed programmes, and should result in the improvement and, if necessary the revision, of existing policies. Several issues which are relevant for the future programmes of irrigation and land development are at present the subject of close scrutiny. These include the need for more efficient management and control of water usage in the existing schemes as well as the improvement in our pattern of colonisation so as to create conditions for a type of agriculture which is economically more viable and more advanced than at present.

However, as in the case of agricultural development proposals, I feel it would be useful to publish the draft proposals of the Ministry of Land, Irrigation and Power as they provide to the general public an indication of the programmes

of development that are being examined and reviewed for inclusion in an overall plan. The publication of these proposals would create an opportunity for informed discussion and criticism of development plans before they are finally adopted for implementation.

Prime Minister and Minister of Planning and
Economic Affairs.

FOREWORD

THE Five Year Programme of the Ministry of Land, Irrigation and Power contains proposals for the extension of irrigation facilities to additional new lands for the cultivation of paddy, subsidiary food crops, sugarcane as well as other crops. In addition, they will benefit existing paddy lands which are not at present supplied with adequate irrigation. The opening of new lands will provide for the settlement of about 45,000 families in colonisation schemes and about 25,000 educated youths in Youth Settlement Schemes. The Power development contains proposals for the development of Power to meet the needs of industry and agriculture as well as rural electrification. The five year programme is a tentative one and is placed before the public so that in the light of criticism and suggestions received it can be modified and adjusted for incorporation in the co-ordinated orverall planned development of the country under preparation by the Government.

2. The Irrigation Programme will benefit 237,000 acres. Of this 142,125 acres will be new Crown lands and 14,350 acres will be private lands. 36,500 acres of lands in village irrigation works will be benefited by improved irrigation facilities. Drainage and reclamation works will bring under cultivation about 19,000 acres of coastal marshes which are not at present cultivated due to flooding and salt water intrusion. In addition, a new programme of lift irrigation has also been drawn up in consultation with the Ministry of Agriculture and Food to provide irrigation by pumping from surface sources as well as ground water sources to benefit 25,000 acres for the cultivation of subsidiary food crops, cash crops, as well as permanent crops like Citrus.

3. One of the drawbacks which has prevented the Irrigation Department from carrying out major construction works has been the lack of machinery. Most of the machinery purchased by the Irrigation Department are over ten years old and have more or less outlived their useful lives. Very little new machinery has been purchased since 1958, when a consignment of reconditioned second hand earth-moving machinery was purchased for the construction of reservoirs inundated by the December 1957 floods. This was mainly because of the foreign exchange difficulties. As a result, even after heavy expenditure on repairs and maintenance, the availability of machinery has only been about 35 per cent. Under the circumstances, a heavy replacement programme is inevitable. The estimated cost of new machinery required for irrigation works, major, medium as well as village works under the plan is about Rs. 31,000,000. In addition, machinery to the value of Rs. 9,000,000 is required for drainage works and machinery to the value of Rs. 9,000,000 for lift irrigation works.

4. Steps are being taken to expedite the training of Sub-Engineering grades by improving the Training School for Technical Assistants at Galgamuwa, and an increase in the takeover of students to about 100 annually from the present number of 50. The Irrigation research and designs section is being reorganised and strengthened to undertake the investigation and preparation of plans and designs for new items of major works which can be taken up for construction in the latter half of the planned period. The extension of irrigation facilities to new areas as well as the provision of improved irrigation facilities to existing acreages will enable a substantial increase in paddy production to be achieved. Past experience has shown that over 50 per cent of increase in paddy production has been as a result of provision of irrigation to new lands.

5. The irrigation programme which is attended to both by the Department of Irrigation and the River Valleys Development Board provides for a total expenditure of Rs. 396,000,000 spread over the five year plan period. This figure does not include the expenditure of Rs. 126,000,000 phased out for the construction of Samanalawewa.

6. The colonisation programme provides for the settlement of 25,000 families by the Land Commissioner and about 20,000 families by the River Valleys Development Board. This should considerably relieve the pressure of landlessness in congested areas as well as help in the solving of the unemployment problem. In addition, the Youth Settlement programme provides for the settlement of 25,000 youths. These youth settlements are being organised so that they will set an example to peasants in the areas in modern scientific methods of agricultural practices. The main emphasis in Youth Settlement Schemes will be in the cultivation of subsidiary food crops and cash crops. All the improved techniques of cultivation will be adopted and partial mechanisation will be resorted to where necessary. In the case of colonisation schemes, part of the new lands which are being provided with irrigation facilities under the planned period have already been alienated under the scheme of settlement of colonsists prior to provision of irrigation facilities so that the colonists themselves can participate in the process of development of their new land and the provision of irrigation facilities.

7. There has always been a time lag between the provision of irrigation facilities to a land in the dry zone and development and cultivation with irrigation facilities. This time lag is due to the time taken by a peasant to stump and level his allotment. It causes great hardship to the peasant cultivator and to loss of income in the form of missed crops. In order to save the loss on production, the system of advanced alienation was adopted which was an attempt to get the land developed by the allottees during the time taken to provide irrigation facilities. The colonists are put in possession of the land simultaneously with the beginning of the construction of irrigation facilities. Unfortunately, this increases the suffering of the cultivators manifold. It is difficult to provide them with drinking water and health facilities.

8. In the Gal Oya Development Scheme land was opened up for the settlers by heavy machinery before alienation. This was given up on account of the difficulty in finding foreign exchange to purchase the heavy machinery required. Quite apart from relieving the human suffering, I feel that we should re-adopt the system of jungle clearing and stumping by machines, not mainly because of human suffering which have to be undergone by farmers but because of the time saved in the development operations which can be used for the cultivation of crops. A bulldozer can develop 400 acres of jungle land a year. An average acre produces over 70 bushels of paddy for the two crops. The value at the imported price of rice at £. 42 per ton is $\frac{400 \times 70 \times 42}{70} = £.\ 16{,}800$ which is more than the value of the bulldozer. Therefore, action will be taken by this Ministry to obtain funds for mechanising land development in dry zone areas.

9. The land programme also provides for the development of Cashew and Citrus. Citrus in the traditional citrus growing areas had been affected by pests and diseases and is declining. The services of Israeli experts were obtained and they recommended the north-western sector of the Island for development in citurs. Necessary ground water surveys are being carried out and depending on the success of the surveys the citrus growing project will be undertaken on a large scale.

Cashew is a valuable cash crop bringing in considerable foregin exchange to countries like India. It could grow on marginal soils with a minimum supply of water. The plan provides for the extension of cashew cultivation on a large scale.

In addition, about 10,000 acres of land in the Southern and Sabaragamuwa provinces will be developed partly in Youth Settlements and partly in colonisation for the cultivation of Tea.

10. The private sector is also being brought into participate in the Government programme of development. The Special Leases Board set up under the Ministry has already alienated 15,000 acres for development by the private sector. The plan provides for futher alienations according to the response by the private sector and according to the financial and technical resources. Alienation of land to the private sector will, however, be for a limited period and will be considered only after the requirements of the peasantry in the area are quite adequately met. Private sector participation in development of land and bringing into production besides adding to the national product will also provide considerable employment opportunities and relieve the Government of considerable capital expenditure.

11. The programme of the Forest Department provides for reafforestation of a sufficient extent of land to counter-balance forests which are being cleared for development purposes or ceased to be forests for other reasons. The total extent of cultivated land at present is about 3,750,000 acres. An acre

of replanted forest yields the same amount of timber as from 30 to 40 acres of natural forest specially in the dry zone and in the up-country. The policy of the Forest Department is therefore to reafforest an extent eqaul to 1/20th of the total extent at present under cultivation, i.e. 187,500 acres. Of this extent, 61,000 acres have been planted in the period 1955 to 1965 and approximately 23,000 acres prior to 1955, making a total of about 84,000 acres. Accordingly, 103,500 acres have to be planted at the rate of about 21,000 acres per year.

12. Reafforestation areas will be selected avoiding areas which are likely to be taken up for development and will be located on the higher contours of ridges separating river valley basins and in the water-sheds of reservoirs. In the dry zone, the main species for reafforestation will be teak which because of its quicker maturity period, better outturn in cubic feet per acre, better quality and durability as well as the better demand, is the best species for the dry zone. The main species in the montane zone will be Eucalyptus and in the wet zone Mahogany as well as soft woods for the match industry. In the sandy regions of the dry zone Casuarina as well as Eucalyptus will be planted.

13. With the rapidly increasing demand for timber both for growing industry as well as for private needs, the exploitation section of the Forest Department will be reorganised. It is proposed to set up a State Timber Corporation to be in charge of exploitation of timber from forest areas, management of saw mills, curing kilns, impregnation plant &c., i.e. to take over all the commercial activities now being carried out by the Forest Department. The Forest Department will thereafter confine its activities to management and conservation of forests, prevention of illicit timber felling etc. The programme also provides for the necessary *infra* structure like the construction of roads, etc. to enable easier exploitation of timber.

14. A pre-investment survey of forest products is being carried out by a team of experts financed by the U.N. Special Fund and the Government of Ceylon and the further development of forest industry will be based on the recommendation of the team.

15. The programme of the State Plantations Corporation provides for the completion of the development of Habarakada, Samanalawatte and Nuwara Eliya State plantations in V.P. tea. It also provides for the development of 1,000 acres in cashew and a similar extent in citrus at Kondachchi in the Mannar district.

16. The programme of the River Valleys Development Board includes the completion of development works in the Gal Oya Valley as well as the construction of two similar reservoirs as well as development of lands under them. The Uda Walawe reservoir, construction of which commenced in 1964, will be completed within the planned period and part of the lands under

it developed by provision of irrigation facilities and settlement of colonists. The programme also tentatively includes the construction of Samanalawewa multi-purpose project subject to Government approval of the scheme.

17. The sugar projects at Gal Oya and Kantalai have not been running successfully mainly due to the poor yields of cane and insufficient extents cultivated. It is proposed to extend the acreage under both projects to provide sufficient cane to keep the factories in full production. Concentrated attempts will also be made to improve the yields as well as the recovery rates. A sugar Cane Research Institute is being set up at Amparai to carry out a variety of trials, fertilizer experiments and disease and pest control.

18. In regard to electricity supply, the system is fed from generating stations with an aggregate installed capacity of 173 MW, this being made up of 111 MW of Hydro and 62 MW of Thermal. The main extra high tension grid links up the Power Stations with Colombo and the areas adjacent to Avissawella, Padukka, through Peradeniya to Kurunegala, through Nuwara Eliya to Badulla, through Negombo to Bolawatte and Puttalam, through Balangoda to Galle. The present maximum demand on the system is 87 MW and the consumption of energy is about 360,000,000 units per annum. These requirements are mainly served by the Hydro stations but the Thermal stations are brought into service at times of maximum demand and also for purposes of conservation of water.

19. In order to meet the anticipated demand both in power and energy, construction has commenced on the first stage of the Maskeliya Oya Project which will feed into the system an additional 75 MW of power and 313,000,000 units, and it is anticipated that this stage will be in commission by 1969/70.

20. In order to utilise the power available from this new Power Station (at Polpitiya) tenders have been called for considerable additions to the transmission network. The main extra high tension lines will be strengthened from Polpitiya to Colombo and extensions will be made through Dambulla, Anuradhapura, Vavuniya, Paranthan, into the Jaffna Peninsula at Chunnakam. These will be supported by the construction of additional sub-transmission lines totalling 500 miles.

21. In regard to better facilities and voltage regulation in Colombo city, a fourth primary substation is being constructed in Borella, and tenders have been called for the equipment for 40 consumer sub-stations.

22. In order to meet further demands around 1971/72, plans and specifications are being prepared for a power unit of 30 MW which will produce 120,000,000 additional units of energy.

23. Rural electrification which has hitherto made only slow progress will be speeded up. Work on 50 villages is at present under way, and the five year programme envisages an extension of power supply to 500 villages at the rate of 100 a year.

24. The programme envisaged is no doubt an ambitious one and difficulties are bound to arise. I am however confident that with personal interest and consistent hardwork by all officers of the Ministry and in the districts including the Government Agents the target set out can be achieved.

C. P. de Silva

Minister of Land, Irrigation and Power.

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SECTION I

Irrigation and Drainage

CHAPTER I

INTRODUCTION

Background

Rice is the staple diet of Ceylon and paddy cultivation is the main occupation in the rural areas, and has been so, from time immemorial. A glance at the mile to an inch map, which shows the numerous small tanks which dot the Island, will bear testimony to this. With the shifting of the population to the wet zone areas in the 17th and 18th centuries, the irrigation works in the dry zone fell to decay. In the 19th century and the first quarter of the 20th century the export crops of tea, rubber and coconut were rapidly developed in the wet zone and in the hill country. With the increase in population and the consequent unemployment problem it became necessary to develop the dry zone. The question of the development of the dry zone irrigation works was taken up sporadically from about 1880 and received an impetus since 1940 with the eradication of Malaria.

2. Of Ceylon's total requirements of roughly 1,300,000 tons of rice, 700,000 tons are produced locally while the balance is imported. Rice being the staple diet and paddy the traditional cultivation, irrigation hitherto has been directed towards paddy cultivation. Of the total asweddumised area 1,249,000 acres of paddy land, roughly 736,000 acres are irrigated under major or minor schemes. In the wet zone areas where rainfall is adequate and fairly evenly distributed and where the streams are perennial, irrigation works providing for storage as in the dry zone are not necessary and consequently most of the areas in the wet zone are irrigated under minor schemes or are rainfed. Minor schemes in the wet zone areas consist mainly of small anicut schemes for diversion of water from perennial streams or the construction of drainage works. The wet zone areas being more or less fully developed under export crops, there is no land available for extension of irrigation. The development of the dry zone was taken up to relieve the population pressures and unemployment in the wet zone areas, to relieve the underemployment in the dry zone areas and to provide assured sources of water supply as well as expansion of the acreage for increasing paddy production. Since the colonisation of the dry zone areas was taken up, over 50,000 families have been settled in the dry zone areas by shifting of the population from the congested wet zone. Major irrigation works in the dry zone provide a comparatively assured supply of water from more or less perennial sources of rivers which have their catchment areas in the wet hilly country. On the other hand, village works have small catchment areas around the tank itself and the probability of the tank filling and an assured supply of water is entirely dependent on the local rains.

An assured supply of water is a pre-requisite of successful cultivation and more so if the cultivators have to intensify cultivation by improved methods at more expense in purelines, transplanting, agro-chemicals and weedicides.

Progress in Provision of Irrigation Facilities, 1954–64

3. The following statement gives the increase in the total asweddumised land in the period between 1954 and 1964 and the increase in the extent of land provided with irrigation facilities under major and minor works.

A

Year	*Major Schemes*	*Minor Schemes*	*Rain fed*	*Total Asweddumised Area*
1954	269,853	292,669	469,989	1,032,511
1964	365,949	370,411	512,796	1,249,156
Increase	96,096	77,742	42,807	216,645

The cultivated acreage in the above holdings for the years 1954 and 1964 giving the total acreage cultivated for both Maha and Yala under these Schemes are given below :

B

Year	*Major Schemes*	*Minor Schemes*	*Rainfed*	*Total Asweddumised Area*
1954	338,700	316,400	598,700	1,253,800
1964	483,700	425,900	626,500	1,536,100
Increase	145,000	109,500	27,800	282,300

4. It will be seen from the statement at 'A' above that the extent of land provided with irrigation facilities under major and minor schemes has increased during this period of ten years by 173,850 acres while the extent cultivated during Maha and Yala under irrigation (crop acreage) has increased by 254,500 acres during the same period—'B' above.

Paddy production during these periods rose from 31,000,000 bushels to 50,500,000 bushels or an increase of 19,500,000 bushels during the ten year period. Of this increase the increase in crop acreage under irrigation of 254,500 contributed about 10,000,000 bushels (allowing a low yield of 40 bushels per acre for virgin land) and the increase due to improved cultural methods and fertilizing is about 9.5 million bushels. In other words, more than 50 per cent of the increase in local paddy production is due to the additional irrigational facilities provided. In terms of foreign exchange the saving to the country as a result of new acreages provided with irrigation facilities is about Rs. 65,000,000 a year.

5. It is interesting to mention here that the yields in the Polonnaruwa district are the highest in the Island and contribute very heavily towards improving the general average for yields for the whole Island.

The average yield in Polonnaruwa for the years 1954 and 1964 for Maha were 43.7 bushels per acre and 57.1 bushels per acre respectively as against the all-Island average of 30.1 bushels and 38.6 bushels and the yields for Yala were 46.8 bushels in 1954 and 48 bushels in 1964 for Polonnaruwa as against 29.9 in 1954 and 38.9 in 1964 for the whole Island. If the extent and production of the Polonnaruwa district are excluded from the all-Island average, the average for the rest of the Island excluding Polonnaruwa district will drop considerably.

6. The progress in the provision of Irrigation facilities received a severe set-back as a result of the heavy damage caused by the disastrous floods of 1957 to irrigation works. The floods breached 27 major reservoirs irrigating 86,506 acres and 1,100 village works irrigating 45,000 acres. The work involved in repairing the flood damage and restoring the tanks continued over a period of 4 to 5 financial years commencing with the financial year 1957/58 and continuing up to 1960/61. The expenditure on repairs of flood damages was met from a separate vote and amounted to nearly Rs. 40 million. Besides repairing the flood damage, extensive preventive measures were also taken up to prevent a repetition of flood damages of this magnitude. All the heavy machinery and construction equipment were diverted for repairing breaches and for the earth work involved in this flood damage. During these 4 to 5 years period, there was a considerable set-back to the normal departmental programme of new construction. The full extent of 131,506 acres of fields under the breached tanks was brought back under cultivation.

Irrigation Policy

7. Irrigation, as already stated, has been mainly undertaken for the provision of water for paddy cultivation. Paddy is a crop which demands a large amount of water. One of the reasons for high water consumption in paddy cultivation is the practice of mudding before ploughing and the flooding of paddy fields for weed control. If dry ploughing with tractors and implements are undertaken and weeding by hand or inter cultivators are undertaken or chemical weedicides used it will be possible to reduce water consumption and bring in a greater acreage under cultivation. While the desirability of changing the crop pattern under irrigation has been evident over a long time, there are certain factors which have to be taken into consideration. Paddy has been the traditional pattern of agriculture in the Island and any change will have to be gradual in view of the conservatism of the peasant. A start has been made for diversification of crops other than paddy by the cultivation of sugar cane under irrigation at Gal Oya and Kantalai. About 6,000 acres have been cultivated under irrigation with sugar cane at Gal Oya and about 5,000 acres at Kantalai. These crops will be expanded to 12,000 acres and 8,000 acres respectively at Gal Oya and Kantalai.

8. There are however large extents in the Nuwara Eliya and Badulla districts which have been cultivated with vegetables under irrigation. It is proposed to reserve the entire acreage under the Ambawela and Kandaela Reservoir Schemes amounting to nearly 2,000 acres for vegetable cultivation in the next 5 year period. The soil, rainfall and climatic conditions in this area are suitable for vegetable cultivation.

9. The change of cropping pattern under the irrigation works which are marginal for paddy cultivation will make these irrigation works economical if the cultivation of other crops are undertaken. Malwatu Oya Reservoir Project as originally designed for the cultivation of paddy crops was uneconomical as the cost benefit ratio was 0.75. The soil conditions under this project are suitable for the cultivation of subsidiary food crops. The scheme is being re-examined for working on a cropping pattern consisting of subsidiary food crops and fruit cultivation.

10. The Uda Walawe Reservoir Project provides for the development of 7,000 acres under sugar cane and about 15,000 acres under cotton.

11. Three tanks in the Northern Province where the soil conditions are suitable for cultivation of subsidiary food crops and where the agricultural know how and skills are available have been set apart for the cultivation of these crops in the Plan Period. The extent involved is 15,000 acres.

12. The provision of lift irrigation for cultivation of highlands subsidiary food crops and cash crops will also receive attention.

CHAPTER II

PROGRAMME OF IRRIGATION AND DRAINAGE

The five year programme of Irrigation includes the provision of irrigation facilities to 128,625 acres of new Crown land and 14,350 acres of private lands under multi-purpose major and medium scale irrigation works. In addition 13,500 new acreage will be provided with irrigation facilities under village works. 36,500 acres of existing paddy land will also be benefited by the improvement to village works. Of the 142,125 acres of Crown land to be provided with irrigation facitlities 20,000 acres will be utilised for cultivation of subsidary food crops. Drainage schemes will provide benefit to about 19,000 acres. About 18,000 acres in the Gal Oya and Uda Walawe projects will be provided with irrigation for sugar and other crops. About 72,000 acres of highland will also be developed.

2. The lift irrigation programme provides for development of 10,000 acres in existing colonisation schemes under subsidiary food crops, 5,000 acres of new land for settling of unemployed youths and cultivation of subsidiary food crops and an additional 5,000 acres from ground water for subsidiary food crops making a total of 20,000 acres under lift irrigation for subsidiary food crops.

3. The investment programme is in the order of Rs. 360 millions (including R. V. D. B.) of which the foreign exchange component will be about Rs. 140 millions.

4. A rough assessment of the annual benefits of the programme in terms of increase in production and saving in foreign exchange is as follows :

	Rs.
(1) Paddy 140,000 acres + 50% for double Cropping × 40 bushels per acre at Rs. 6.50	50,000,000
(2) Subsidiary food crops—	
(*a*) Chillies 40,000 acres at 10 cwt. per acre 75% success × Rs. 100 per cwt.	30,000,000
(*b*) Bombay Onions 20,000 acres at 3 tons per acre 75% success × Rs. 400 per ton	18,000,000
	98,000,000

5. Benefits of other crops cultivated in rotation as well as benefits of development of highland have not been included in the above statement. Benefits derived from better drainage provision of irrigation facilities to private lands as well as improved irrigation faciliteis under Village Works have also not been included.

6. The expanded programme of construction will provide employment opportunities to large numbers directly in construction works. Settlement of about 60,000 families on the 128,625 acres of Crown land to be newly opened will considerably relieve unemployment. Ancillary services in the new colonies will also open out avenues of employment.

A phased programme is given as appendix A to this Chapter.

APPENDIX A

Year	River Valleys Development Board		Major Works in Acres		Medium Scale Works in Acres		Village Works in Acres	Drainage and Reclamation works in Acres	Lift Irrigation works in Acres	Total Acres Irrigable Area	Total Development including Highland Acres
	Irrigable Area Acres	Highland Acres	Irrigable Area Acres	Highland Acres	Irrigable Area Acres	Highland Acres					
1966	3,660	2,000	13,990	7,805	7,212	2,932	5,476	3,000	3,000	36,338	49,075
1967	4,000	3,600	12,564	6,578	9,011	3,982	8,755	5,200	5,000	44,530	58,690
1968	11,000	7,000	13,502	5,367	7,640	3,681	13,206	5,800	7,000	58,148	74,196
1969	11,500	9,000	14,350	5,425	9,052	4,603	12,505	3,800	5,000	56,207	75,235
1970	7,000	4,400	10,400	3,250	8,196	3,642	10,091	1,250	5,000	41,937	53,229
Total	37,160	26,000	64,806	28,425	41,111	18,840	50,033	19,050	25,000	237,160	310,425

CHAPTER III

SURFACE IRRIGATION PROGRAMME

Classification of Surface Irrigation Works

For purposes of convenience, the irrigation works from gravity sources have been classified into 4 categories :—

(1) Multi-purpose schemes and other schemes under the administration of the River Valleys Board.

(2) Major irrigation works which includes all works costing Rs. 4 million and above and providing irrigation to 2,000 acres and above.

(3) Medium scale works—This includes all works itemized in the Estimates costing over Rs. 75,000.

(4) Village works costing less than Rs. 75,000 but over Rs. 10,000.

Multi-purpose Schemes

2. The programme of the River Valleys Development Board provides for the supply of irrigation facilites to 3,660 acres for cultivation of paddy and 4,000 acres for the cultivation of sugar cane under the main Gal Oya Reservoir. Work will also commence in the Pannalagama Tank and Pannala Oya Reservoir and the acreage to be provided with irrigation facilites under these two schemes during the plan period will be 5,000 acres. It is also proposed to develop about 12,000 acres of highland for the cultivation of other crops in the Gal Oya Valley. The programme under Uda Walawe provides for the development of 28,500 acres to be supplied with water during the plan period, the development of 14,000 acres for other food crops and the development of 12,000 acres of highland. Details of the work of the River Valleys Development Board will be dealt with separately. The phased programme is given below :

	65–66	*66–67*	*67–68*	*68–69*	*69–70*	*Total*
Irrigated Paddy						
Uda Walawe	—	3,500	10,000	10,000	5,000	28,500
Gal Oya Valley	3,660	—	—	—	—	3,660
Pannalagama	—	500	1,000	1,000	1,000	3,500
Pannala Oya	—	—	—	500	1,000	1,500
Total	3,660	4,000	11,000	11,500	7,000	37,160
Irrigation other crops						
Uda Walawe	200	9,000	1,500	2,900	500	14,100
Gal Oya Valley	2,000	2,000	—	—	—	4,000
Total	2,200	11,000	1,500	2,900	500	18,100

Highland	*65–66*	*66–67*	*67–68*	*68–69*	*69–70*	*Total*
Uda Walawe	—	1,600	5,000	5,000	400	12,000
Gal Oya Valley	—	2,000	2,000	4,000	4,000	12,000
Total	—	3,600	7,000	9,000	4,400	24,000

Major Schemes

3. This consists of 10 items on the continuation list with a total irrigable area of 68,388 acres of new land and 3,869 acres of existing lands for which improved irrigation facilities have to be provided. Of this extent 23,106 acres of new land and 1,945 acres of existing lands have already been provided with irrigation facilities at the commencement of the plan period. It is proposed to complete the provision of irrigation facilities to the 45,282 acres of new land and 1,924 acres of existing land which are left over. Six new items of major schemes for some of which plans are ready and for the balance for which plans can be prepared within the next two years will be taken up for construction during the plan period. Muthuiyankaddukulam and Visvamaddukulam and Vavunikulam with an irrigable command of 15,000 acres will be entirely utilised for water supply for subsidiary food crops. The particulars of these new schemes are as follows :—

Name of Scheme	*New Area Benefited Acres*	*Existing Area Benefited Acres*
1. Murutawela	3,000	4,000
2. Malwatu Oya Reservoir	12,000	20,000
3. Nagadeepawewa	4,000	—
4. Pimburettawewa	4,000	—
5. Mahadivuiwewa	4,000	—
6. Wahalkada	2,000	—

About 17,000 acres under these schemes can be provided with irrigation facilities during the plan period. The programme of development also provides for the development of 28,425 acres of highland under the continuation and new schemes during the plan period.

4. The following is a summary of the programme of development under major schemes :

	Extent to be Benefited				*Expenditure on Headworks and I. FF.*		
Year	*Irrigable area in Acres*			*Highland*	*Foreign*	*Local*	*Total*
	Crown	*Private*	*Total*	*Acres*	*Rs.*	*Rs.*	*Rs.*
1966	13,234	756	13,990	7,805	12,655	9,950	22,605
1967	12,396	168	12,564	6,578	16,550	13,100	29,650
1968	13,402	100	13,502	5,367	19,240	13,825	33,065
1969	14,350	—	14,350	5,425	16,710	14,415	31,125
1970	5,500	4,900	10,400	3,250	12,610	10,025	22,635
Total	58,882	5,924	64,806	28,425	77,765	61,315	139,080

5. A brief description of Major Irrigation Schemes under Construction and to be taken up for construction is given below :

(1) MINIPE YODI ELA SCHEME—EXTENSION OF L. B. CHANNEL

The Minipe Yodi Ela Scheme is a diversion scheme on the left bank of the Mahaweli Ganga, the largest river in Ceylon. It comprises a diversion anicut across the Mahaweli Ganga, an inlet sluice to control water into the main irrigation channel, a main irrigation channel 18¼ miles long and minor channels for the development of 3,200 acres of new lands in the Kandy District under two rice crops per year. The scheme was completed about 15 years ago.

The Extension Scheme now under construction provides for—

(1) Improvements to the existing anicut, head sluice and main channel to supply water to an additional 18,000 acres of land in the Kandy and Matale Districts for two rice crops an year. This forms Stage I of the Scheme.

(2) The extension of the main channel by about 13 miles and the construction of the minor channels to develop 3,260 acres of land in the Kandy District between the Hasalaka Oya and Heen Ganga under two rice crops per year. This forms Stage II of the Scheme.

(3) The extension of the main channel from Stage II by another 11 miles, the construction of minor channels to develop an extent of 2,600 acres in the Matale District between Heen Ganga and Gamburu Oya for two rice crops annually and to benefit an additional 1,100 acres under minor schemes within the irrigable command. This is Stage III of the Scheme.

(4) The extension of the main channel from Stage III by about 5½ miles and the construction of minor channels to develop 3,000 acres in the Matale District for two rice crops an year. This forms Stage IV of the Scheme.

The construction of Stages I and II is nearing completion.

(2) MUTTU AIYANKADDUKULAM

Total estimated cost—Rs. 9,000,000

This scheme is situated in the Vavuniya District. It involes the restoration of a large, ancient breached tank to a capacity of 32,829 ac. ft. by the filling of the breaches, improvements to the bund, construction of sluices and spillways. The construction of main, distributory and field channels and access roads is also necessary. It is capable of irrigating 6,000 acres of land for paddy cultivation or 12,000 acres under subsidiary foodcrops. Crown land is available in the vicinity for irrigation and alienation to colonists. It was intended to settle 1,600 landless peasant families on 3 acres unit of paddy land with 2 acres of highland for homestead and garden crops.

It has since been decided to develop 12,000 acres under this tank for the cultivation of subsidiary crops instead of paddy. The construction of the earthen embankment is in good progress. The left bank main channel is also under construction.

(3) RESTORATION OF VAVUNIKULAM

Total estimated cost—Rs. 8,300,000

The scheme is situated in the Vavuniya District. It involved the restoration of an ancient breached and abandoned tank, which at one time trammelled the waters of the Pali Aru, to a capacity of 34,947 ac. ft. to irrigate 6,000 acres for rice cultivation. Apart from the improvements to the tank embankment, filling of breaches and construction of sluices and spillways, for the headworks, necessary access roads, main, distributory and field channels are also to be provided.

Crown land is available below the tank for irrigation and alienation to the colonists. 2,000 landless peasant families have been settled on 3 acre units of paddy land with 2 acres of highland for homestead and garden crops.

(4) MORAWEWA EXTENSION SCHEME

Morawewa is situated in the Trincomalee District, Eastern Province, and is being restored to a capacity of 25,100 ac. ft. at a cost of Rs. 5,000,000 to provide irrigation, drainage and access facilities to 3,000 acres of crown lands. This work is nearing completion.

The proposed extension of the Morawewa Scheme, (being taken up as Stage II of the Scheme) is to extend the channel system to irrigate an additional 1,000 acres of crown land as sufficient water is available from the tank.

The estimated cost for providing irrigation, drainage and access facilities to an additional 1,000 acres of crown land is Rs. 1,000,000 with a benefit cost ratio of 1.92.

(5) HAKWATUNA OYA RESERVOIR SCHEME

Total estimated cost—Rs. 10,500,000.

This scheme is situated in the Kurunegala District. The work involves the restoration of an ancient abandoned reservoir on the Hakwatuna Oya to a capacity of 16,500 ac. ft. by the filling of breaches, construction of sluice, a large concrete spillway, and the provision of irrigation, drainage and access facilities to 4,000 acres of new lands for paddy cultivation.

Necessary crown land is available below the reservoir for irrigation and alienation to the colonists. It is intended to settle 1,300 landless peasant families on 3 acre units of paddy land, with 2 acre units of highland for homesteads and garden crops.

(6) MAHAKANDARAWA SCHEME—INCLUDING THE EXTENSION

Estimated cost—Restoration of Headworks and provision of irrigation facilities to 4,000 acres Rs. 10 M. ;
Extension Scheme Rs. 3.0 M.

Mahakandarawa Scheme is situated in the Anuradhapura District. It involves the restoration of an ancient abandoned tank straddling the Weli-Oya to a capacity of 26,000 acre feet and provision of irrigation, drainage and access facilities to 4,000 acres of new crown land for paddy cultivation and also opening up of about 1,500 acres of highland for homesteads and cultivating of garden crops. The restoration of the headworks involved improvements to and raising of the tank embankment, closing of the breaches, construction of spillways, left and right bank sluices, deviation of 2 miles of the Puttalam-Trincomalee Trunk Road which were liable to submergence, etc. The land has been blocked out into 3 acre units of paddy and 2 acre units of highland and landless peasant families have already been settled on these allotments. The spill of the tank was subsequently raised and capacity of the tank increased, to benefit 2,000 acres.

The cost of provision of irrigation, drainage and access facilities to these additional 2,000 acres of paddy is estimated at Rs. 3.0 M. and on completion of the work, 630 landless peasant families could be settled.

(7) PADAVIYA EXTENSION SCHEME

Total estimated cost including provision of irrigation facilities Rs. 7.25 million.

This scheme is located in Anuradhapura District.

Padaviya Tank was restored about 5 years ago to impound 72,000 acre feet of water. The capacity of the tank was subsequently increased by the raising of the spill by 2 ft. This would increase the capacity of the tank to 85,000 ac. ft. The additional storage so impounded is to be utilised for the development of 5,000 acres of new land for the settlement of landless peasant families.

The 5,000 acres contemplated to be developed under the Extension Scheme are available for alienation immediately. There is a very keen demand for land in this area. It is intended to settle 1,666 families on 3 acre allotments of paddy with 2 acres of highland for homesteads.

The cost of construction of raising the spill and improvements to the bund and provision of irrigation, drainage and access facilities is estimated at Rs. 7,250,000.

(8) RAJANGANA WEWA

Total estimated cost (including provision of irrigation facilities) Rs. 31.0 Million.

This is a new reservoir and not the restoration of an ancient breached tank.

This scheme is located in the Kurunegala District. The Scheme envisages the construction of a massive earth embankment across the Kala Oya to impound 80,000 acre ft. of water. This reservoir will have a large concrete spillway in the river section and sluices on either flanks.

Apart from the construction of the headworks, access roads, channels, etc. are also necessary. When completed the scheme is capable of irrigating 15,000 acres of new lands for paddy cultivation. The construction of the earthen embankment and the L. B. sluice have been completed while about 80% of the work on the spill and R. B. sluice has been completed. The work on the main and distributory channels are in good progress and it is expected to provide irrigation to about 3,500 acres before the end of this year.

(9) KAUDULLA SCHEME—STAGES I AND II

Total estimated cost (including construction and provision of irrigation facilities)—Stage I—Rs. 8.0 M. and Stage II—Rs. 9.5 M.

This scheme is situated in the Polonnaruwa District. The tank drains 32 square miles of clear catchment and is also augmented by the flood flows from Gal Oya and the Minneriya spill. Stage I of the development is to store 45,000 ac. ft. in the reservoir in the first instance to develop 4,000 acres of new irrigated paddy for settlement of 1,300 landless peasant families. This stage of the work involved raising the tank embankment and filling of breaches, and the construction of sluice, spillways and the channel system.

The base and top width of the main dam were so constructed as to provide for further final raising. Stage I of the scheme is now nearing completion.

Stage II of the scheme involves the construction of new 650 ft. long concrete clear over fall spillway and necessary improvements to the tank embankment which will increase the impounding capacity of the reservoir from 45,000 ac. ft. to 65,000 ac. ft., a new reinforced concrete tower-cum-conduit sluice with appurtenant approach and outlet channels on the Left Bank, effecting additional safety measures and provision of irrigation, drainage and access facilities to 6,000 acres of new crown lands which will bring the total development to 10,000 acres under Stages I and II.

Crown land is available in the vicinity for irrigation and alienation to colonists. It is intended to settle 2,000 landless peasant families on 3 acre units of paddy land with 2 acres of highland for homesteads and garden crops.

1. Muruthawela Reservoir Scheme

This is a new reservoir and not a restoration. Urubokke Oya which drains an area of approximately 136 sq. miles has one major tank Udukiriwila and several diversion weirs feeding 2,940 acres. Udukiriwila Tank in addition irrigates 1,000 acres from a high level channel. In the Kirama Oya adjacent basin 4,938 acres are being cultivated by a combination of diversion weirs and Kirama Reservoir. About 50% of the acreage under Urubokke Oya and very little under Kirama Oya are now being cultivated for Yala. The proposals envisage construction of a reservoir of capacity 38,000 ac. ft. across Urubokke Oya to feed 3,000 acres of new land directly under the scheme and supplementary irrigation for the existing fields under Urubokke Oya and Kirama Oya Scheme. The cost of the scheme is Rs. 14,000,000. The foreign portion is Rs. 8,400,000 and Rs. 5,600,000 local costs.

2. Malwatu Oya Scheme

This is a new reservoir and not a restoration of ancient tank. The Malwatu Oya or Aruvi Aru is one of the largest river basins in Ceylon with a catchment area of 850.6 sq. miles. The Government of the Union of Soviet Socialist Republic through the Soviet Organisation known as Technopromexport, Moscow, have prepared a project report on the Malwatu Oya Reservoir Scheme which envisages construction of a reservoir at Kappachchi with a capactiy of 282,000 ac. ft. to irrigate 12,000 acres of new land annually and 20,000 acres of existing land under two major schemes Giant's Tank and Akathimuruppu, and to produce 800 kw. of Hydro-power. The cost of the scheme is Rs. 80,717,000 which consists of Rs. 35,570,000 of foreign portion and Rs. 45,147,000 of local portion. Studies are now being made to modify the scheme to make it more economical and to take up cultivation of subsidiary food crops.

3. Nagadeepa Maha Wewa

Heppola Oya which is in the Bintenne Division of the Badulla District has a catchment area of 50 sq. miles. There is no major scheme in the catchment, but just outside the catchment in the lower reaches and in the right bank are three major schemes Mapakadawewa, Dambarawa and Soraborawewa. Diversion Weir across Heppola Oya below the proposed Dam site, diverts water to Mapakadawewa to supplement the yield from its catchment.

It is proposed to construct a reservoir across Heppola Oya to intercept a catchment area of 27 sq. miles and to store 13,600 ac. ft. of water. The direct benefits from the scheme will be production of paddy from 4,000 acres for Maha and an average of 1,150 acres for Yala. In addition 1,020 acres under Mapakadawewa will be assured of successful cultivation. The other benefits will be the social benefits from relief of unemployment, settling 2,000 landless peasant families and reduction of flood peak below the reservoir. The total cost of the scheme is Rs. 10,000,000. Foreign portion is Rs. 6,000,000 and local Rs. 4,000,000.

4. Pimburetewa Tank—Polonnaruwa District

(1) *Location* : It is about 15 miles South-East of Manampitiya Bridge and about 2 miles from Aralaganvilla Tank in Polonnaruwa District. It is across Kuda Oya and about 4 miles U/S of proposed Kuda Oya Reservoir.

(2) *Data* :	Catchment Area	59.5 sq. miles
	Capacity	24,000 ac. ft.
	Irrigable Area	4,000 acres of Crown land for Maha

Sufficient Crown land is also available for highland area.

		Rs.
(3) *Cost* :	Headworks	5,200,000
	Provision of irrigation facilities for 4,000 acres	2,800,000
	Total	8,000,000

$$\text{Pro-rata cost per acre} \quad \frac{\text{Rs. } 8,000,000}{4,000} = \text{Rs. } 2,000$$

(4) The Scheme will bring under paddy cultivation 4,000 acres of jungle land. In addition another 2,000 acres of highland also will be developed.

The tank is situated in an undeveloped area and can be used to settle about 2,000 landless colonists with 2 acre units of paddy land and 1 acre units of highland for homesteads and garden crops.

5. Mahadiulwewa—Trincomalee District

(1) ***Location*** **:** Near the 22nd mile post on Anuradhapura-Trincomalee Road. Tank will innundate part of this road. The Tank is across Nelu Oya.

(2) *Data* :	Catchment	54 sq. miles
	Capacity	25,000 ac. ft.
	Irrigable Area	4,000 acres of Crown land for Maha

Sufficient Crown land is also available for highland.

		Rs.
(3) *Cost* :	Headworks, &c.	3,800,000
	Deviation and raising of P.W.D. Road	1,400,000
	Provision of full irrigation facilities for 4,000 acres	2,800,000
	Total	8,000,000

Pro-rata cost per acre $\frac{8,000,000}{4,000}$

Rs. 2,000

(4) The scheme will bring under paddy cultivation 4,000 acres of jungle land. Further, another 2,000 acres of land will be developed under highland crops.

The scheme can be treated as a colonisation scheme and used to settle 2,000 colonists with 2 acre paddy and 1 acre highland lots.

The irrigable area is adjoining Morawewa Scheme under construction, which benefits 4,000 acres of paddy land and 1,333 acres of highland. Hence, with the implementation of Maha Diulwewa Scheme, a total of 11,333 acres in the area will be developed, under both schemes.

6. Wahalkada Wewa Scheme

Wahalkada Wewa is situated in the North-Central Province about 13 miles N.E. of Kebitigollawa. It is a very large tank in the valley of Tavalam Hamillawa Oya and has been abandoned due to a breach in the tank bund.

It is now proposed to restore the above tank to a full supply level of 150·0 M.S.L. to store 30,000 ac. ft. of water in order to bring 2,000 acres of new lands under cultivation.

The direct benefits to be derived from the above scheme will be the production of paddy from 2,000 acres of new lands for both Maha and Yala. The other benefit will be the social benefits derived from relief of unemployment, settling of 1,000 landless peasant families and the development of additional 1,000 acres of new lands for highland cultivation.

The cost of restoration of the tank and provision of irrigation facilities to 2,000 acres of new lands is Rs. 4,250,000, i.e. 2.55 million rupees foreign and 1.70 million rupees local costs.

The detailed phasing of the programme and financial commitments under the Major Schemes are given in Appendix A–A3 at the end of this Chapter.

Medium Scale Works

There are 111 items under this category. This programme provides for the development of 41,111 acres of irrigable land, and 18,840 acres of highland will be developed under these schemes. One of the tanks Visvamadukulam with an irrigable acreage of 1,200 acres will be entirely devoted for the cultivation of subsidiary food crops. Soil Surveys are being carried to find out the suitability of the land under the irrigable command of other works for subsidiary food crops. The phasing of the programme under this category is as follows :—

Year	*Extent to be benefited Irrigable Area in Acres*			*Highland*	*Anticipated Expenditure in Rupees/Million*		
	Crown	*Private*	*Total*	*Acres*	*Foreign*	*Local*	*Total*
1966	6,802	410	7,212	2,932	4,699	5,398	10,097
1967	8,022	989	9,011	3,982	4,598	6,748	11,346
1968	7,009	631	7,640	3,681	2,923	4,920	7,843
1969	6,423	2,629	9,052	4,603	1,785	4,175	5,960
1970	4,426	3,770	8,196	3,642	1,360	2,960	4,320
Total	32,682	8,429	41,111	18,840	15,365	24,201	39,566

The detailed phasing of the programme and financial commitments are given in Appendix B–B6 at the end of this Chapter.

Village Works

All items costing under Rs. 10,000 are attended to by the Commissioner of Agrarian Services and the responsibility of the Irrigation Department as far as village works are concerned is for work costing over Rs. 10,000 and under Rs. 75,000. Works costing over Rs. 75,000 are included in medium scale works. The programme for the five year period envisages the provision of irrigation facilities to 50,000 acres of which 13,000 acres will be new land. The following table gives the development programme :—

Year	*Extent to be benefited in Acres*			*Anticipated Expenditure in Rupees/Million*		
	Existing	*New*	*Total*	*Local*	*Foreign*	*Total*
1966	3,761	1,715	5,476	1,868	840	2,708
1967	6,120	2,635	8,755	3,518	1,545	5,063
1968	9,560	3,646	13 206	4,537	2,000	6,537
1969	9,191	3,314	12,505	3,827	1,710	5,537
1970	7,884	2,207	10,091	3,826	1,825	5,651
Total	36,516	13,517	50,033	17,576	7,920	25,496

The phasing of expenditure and acreages to be provided with irrigation facilities are given in Appendix C–C2 to this Chapter.

Appendices to Chapter III

A 1—Major Works—Continuation Items—Irrigation Facilities Programme

A 2—Major Works—New Items—Irrigation Facilities Programme

A 3—Major Works—Continuation Items—Expenditure phasing

A 4—Major Works—New Items—Expenditure phasing

B 1—Medium Scale Works—Continuation Items—Summary of Irrigation Facilities Programme by Districts

B 2—Medium Scale Works—New Items—Programme of Irrigation Facilities and Expenditure by Districts

B 3—Medium Scale Works—Continuation Items by Districts and Expenditure phasing

B 4—Medium Scale Works—Continuation Items—Itemised Irrigation Facilities Programme

B 5—Medium Scale Works—New Items—Irrigation Facilities phasing and Expenditure phasing

B 6—Medium Scale Works—Continuation Items—Expenditure phasing

C 1—Village Works—Irrigation Facilities and Expenditure phasing—Summary

C 2—Village Works—Irrigation Facilities Programme by Districts.

STATEMENT A 1

ACREAGE PROGRAMME OF MAJOR WORKS (OVER 2,000 ACRES)

Continuation Works (appearing in the printed Estimates of 65/66)

Name of Scheme	Total Irrigable Area Acres	Extent benefited to end of 1965 Irrigible Area Acres	Extent benefited to end of 1965 Highland Acres	1966 Irrigable Area Acres	1966 Highland Acres	1967 Irrigable Area Acres	1967 Highland Acres	1968 Irrigable Area Acres	1968 Highland Acres	1969 Irrigable Area Acres	1969 Highland Acres	1970 Irrigable Area Acres	1970 Highland Acres	Remarks
1. Minipe Yodi Ela Scheme— Stage II	2,780/478	2,780/244	1,853/—	/234										
Stage III	2,516/131			1,270/48	847	1,246/83	830							
Stage IV	3,000							1,500	1,000	1,500	1,000			
2. Muthuaiyankaddukulam	11,000/1,000			2,000		3,000		3,000/100		3,000		/900		
3. Vavunikulam	5,700/300	4,000/215	2,667	1,000	666	700/85	466							
4. Morawewa	3,000	2,500	833	500	166									
Morawewa Extension	1,000					500	166	500	166					
5. Hakwatuna Oya	3,000/1,400	2,000/1,050	1,333	150/350	100	850	566							
6. Mahakanadarawa	3,440/560	2,840/436	1,893	600/124	400									
Mahakanadarawa Ext.	2,000	—	—	—	—	1,000	500	1,000	500					
7. Padawiya Ext.	5,250	2,450	1,225	1,700	850	1,100	550							
8. Rajangana Wewa	15,000	3,650	—	3,000	3,000	3,000	3,000	3,000	1,500	2,350	1,175			
9. Kaudulla St. I	4,500	2,886	—	1,614	1,076									
Kaudulla St. II *	5,500	—	—	1,400	700	700	350							
10. Giritale RB Ch. Ext.	702	—	—	—		300	150	402	201					
	68,388/3,869	23,106/1,945	9,804	13,234/756	7,805	12,396/168	6,578	9,402/100	3,367	6,850/—	2,175	/900		

*Balance acreage to be taken up depending on adequate replenishment.

Note.—Numerator gives new acreage to be provided with Irrigation facilities. Denominator gives existing acreage to be provided with better irrigation facilities.

STATEMENT A 2

ACREAGE PROGRAMME OF MAJOR WORKS (OVER 2,000 ACRES)

New Schemes ready for Construction

Name of Scheme	Total Irrigable Area Acres	1966 Irrigable Area Acres	1966 Highland Acres	1967 Irrigable Area Acres	1967 Highland Acres	1968 Irrigable Area Acres	1968 Highland Acres	1969 Irrigable Area Acres	1969 Highland Acres	1970 Irrigable Area Acres	1970 Highland Acres
1. Muruthawela Reservoir	$\frac{3,000}{4,000}$							2,000	1,000	$\frac{—}{4,000}$	500
2. Malwattu Oya Reservoir	$\frac{12,000}{20,000}$									1,000	500
3. Nagadeepa Mahawewa	4,000					1,500	750	1,500	750	1,000	500
4. Pimburuttawa Scheme	4,000					1,000	500	1,500	750	1,500	750
5. Maha Diulwewa	4,000					1,500	750	1,500	250	1,000	500
6. Wahalkada Scheme	2,000							1,000	500	1,000	500
Total	$\frac{29,000}{24,000}$					4,000	2,000	7,500	3,250	$\frac{5,500}{4,000}$	3,250

Note.—Numerator gives new acreage to be provided with irrigation facilities.

Denominator gives existing acreage to be provided with better irrigation facilities.

STATEMENT A 3

FIVE YEAR PROGRAMME OF EXPENDITURE UNDER MAJOR WORKS ITEMISED IRRIGATION SCHEMES PROVIDING IRRIGATION FACILITIES FROM 1966 TO 1970

Cost & Expenditure Fig. in Rs. 1,000

Name of Scheme	Cost of Headworks and I.FF	Exp. to end of 1964–65	Programme									
			1965/66		1966/67		1967/68		1968/69		1969/70	
			Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign
Minipe—Stage II	55,000	22,300	350	225	200	100	100	50	—	—	—	—
Stage III	—	—	1,000	2,500	650	800	175	200	100	50	50	25
Stage IV	—	—	—	—	650	1,200	500	400	200	100	100	50
Muthuaiyankaddukulam	9,000	2,800	1,000	2,500	1,000	2,000	1,000	1,000	1,000	500	800	200
Vavunikulam	8,300	6,350	550	350	400	200	250	50	40	10	—	—
Morawewa	5,000	4,100	300	100	250	50	150	50	—	—	—	—
Hakwatuna Oya	10,500	7,800	400	600	400	150	300	100	200	50	—	—
Mahakanadarawa Scheme	10,000	9,350	250	60	150	50	100	40	—	—	—	—
Padaviya Extension	7,250	850	1,200	1,500	1,200	300	1,000	200	800	200	—	—
Mahakanadarawa Extension	3,000	25	100	200	400	500	500	300	600	200	125	50
Rajangana Reservoir	31,000	18,500	3,000	2,000	1,500	1,500	1,000	1,000	1,000	500	800	200
Kaudulla Stage I	8,400	7,250	450	150	250	50	200	50	—	—	—	—
Kaudulla Stage II*	9,100	140	700	2,300	1,000	1,500	1,000	500	1,000	200	600	160*
Giritale R.B. Channel Extension	1,000	20	250	50	250	100	200	50	75	25	—	—
Morawewa Extension	1,000	—	—	—	200	200	200	50	200	75	50	25
Total	158,550	79,485	9,550	12,535	8,500	8,700	6,675	4,040	5,215	1,910	2,525	710

* Programme to be amended depending on replenishment.

STATEMENT A 4

FIVE-YEAR PROGRAMME OF EXPENDITURE UNDER NEW MAJOR SCHEMES READY FOR CONSTRUCTION

Cost & Expenditure Fig. in Rs. 1,000

Name of Scheme	*Total cost of Headworks and I.FF*	*Exp. to 1964–65*	*Programme*									
			1965/66		*1966/67*		*1967/68*		*1968/69*		*1969/70*	
			Local	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*
Muruthawela Reservoir Scheme	14,000	—	80	20	1,000	1,000	1,500	3,500	2,000	2,500	1,000	1,000
Malwatu Oya Reservoir	80,717	—	—	—	—	—	2,000	3,000	5,000	10,000	5,000	10,000
Nagadeepa Maha Wewa	10,000	—	80	20	1,000	2,000	1,000	2,500	1,000	1,000	800	600
Pimburettawa Scheme	8,000	—	80	20	1,000	2,000	1,000	2,500	500	500	300	100
Mahadiulwewa	8,000	—	80	20	1,000	2,000	1,000	2,500	500	500	300	100
Wahalkada Scheme	4,250	—	80	40	600	850	650	1,200	200	300	100	100
Total	124,967	—	400	120	4,600	7,850	7,150	15,200	9,200	14,800	7,500	11,900

STATEMENT B 1

MEDIUM SCALE SCHEMES

Five-Year Programme for provision of Irrigation Facilities under itemised Irrigation Schemes, 1966 to 1970

Summary by Districts

Expenditure in Rs. 1,000
Extent : Numerator—Crown Land
Denominator—Private Land
I denotes—Irrigable area
H denotes—Highland area

District	Total Acreage benefited		Total Estimated Cost for Head Works & I.FF	Approx: Exp. to end of 64/65	Extent benefited to end of 1965		Extent to be benefited during										Remarks
							1966		1967		1968		1969		1970		
	Irrigable	Highland			I	H	I	H	I	H	I	H	I	H	I	H	
1. **Kandy**	174	—	110	45	—/100	—	—	—	74	—	—	—	—	—	—	—	
2. **Matale**	1,350	200	1,645	560	250	75	900	125	—	—	—	—	100	—	100	—	
3. **Nuwara Eliya**	416	—	330	130	—/76	—	78	—	100	—	115/47	—	—	—	—	—	
4. **Hambantota**	997	310	1,725	1,335	425	140	551/21	170	—	—	—	—	—	—	—	—	
5. **Vavuniya**	2,754	1,091	4,230	2,440	466/700	422	620	213	968	456	—	—	—	—	—	—	
6. **Jaffna**	7,303	3,817	10,130	4,760	1,500	1,000	1,384/182	635	1,600	815	1,537/172	817	772/29	426	127	124	
7. **Mannar**	858	420	1,342	835	—/60	—	322/96	222	207/173	198	—	—	—	—	—	—	
8. **Batticaloa**	7,622	2,152	10,015	4,070	158	72	410	199	2,099/61	655	2,899/45	698	1,150	409	800	119	
9. **Trincomalee**	16,294	5,287	33,969	29,715	7,100/7,012	4,716	894	57	488	150	600	250	200	114	—	—	

10. Kurunegala	532	420	895	696	208	190	260/64	230	—	—	—	—	—	—	—	—
11. Puttalam	1,245	1,038	1,930	912	126/60	126	200	200	100/110	100	312/37	312	300	300	—	—
12. Anuradhapura	3,716	2,355	5,216	3,245	2,817/131	1,748	228/47	264	300/18	343	175	—	—	—	—	—
13. Polonnaruwa	3,483	2,024	3,665	3,270	2,307	1,535	327	47	849	442	—	—	—	—	—	—
14. Badulla	3,393	1,785	7,060	3,618	516/291	516	300	356	439/597	392	570/180	320	500	201	—	—
15. Monaragala	2,267	1,361	4,330	2,430	361/368	325	328	214	698/30	406	351	285	131	131	—	—
16. Ratnapura	630	157	1,250	10	—	—	—	—	100	25	200	50	330	82	—	—
Total	53,034	22,417	87,842	58,071	16,234/8,798	10,865	6,802/410	2,932	8,022/989	3,982	6,759/481	2,732	3,483/29	1,663	1,027	243

STATEMENT B 2

PROGRAMME OF DEVELOPMENT UNDER IRRIGATION PROJECTS WHICH CAN BE IMPLEMENTED DURING THE FIVE YEAR PERIOD, 1966-70

Summary by Districts

Extent : Numerator—Crown Land
Denominator—Private Land

Cost in Rs. 1,000

District	Estimated Cost			Acreage bene-fited	*Estimated Expenditure and Extent to be provided with I.FF.*														
					1966			*1967*			*1968*			*1969*			*1970*		
	Loc.	For.	Total		Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.
Colombo	138	120	258	—/250	—	—	—	50	50	—	50	50	—/150	38	20	—/100	—	—	—
Matale	1,060	575	1,635	1,660	—	—	—	400	175	—	200	185	100	200	35	1,225	150	30	225
Nuwara Eliya	370	100	470	300	—	—	—	245	90	—	50	10	—	50	—	—	25	—	300
Jaffna	1,025	440	1,465	200/3,000	—	—	—	100	50	—	260	190	—	260	65	100/500	255	60	100/1,000
Mannar	710	315	1,025	575	—	—	—	400	175	—	130	50	—	100	35	200	80	55	375
Batticaloa	1,900	1,170	3,070	1,065/4,570	—	—	—	220	75	—	295	225	100	605	335	365/2,000	510	85	200/2,570
Trincomalee	1,600	900	2,500	1,700/545	—	—	—	70	30	—	100	150	—	100	70	—	150	530	100/200
Kurunegala	210	70	280	265	—	—	—	—	—	—	—	—	—	50	30	—	160	40	265
Puttalam	755	945	1,700	605	—	—	—	100	180	—	200	350	—	250	260	—	185	115	605
Anuradhapura	165	45	210	145	—	—	—	—	—	—	—	—	—	47	15	—	118	30	145
Polonnaruwa	450	225	675	510	—	—	—	50	20	—	75	90	50	110	85	100	215	30	360
Badulla	82	30	112	150	—	—	—	—	—	—	—	—	—	50	10	—	32	20	150
Moneragala	490	325	815	524	—	—	—	240	80	—	90	200	—	90	40	450	70	5	74
Ratnapura	275	75	350	1,000	—	—	—	125	75	—	50	—	—	50	—	500	50	—	500
Total	9,230	5,335	14,565	8,699/8,365	—	—	—	2,000	1,000	—	1,500	1,500	250/150	2,000	1,000	2,940/2,600	2,000	1,000	3,399/3,770

STATEMENT B 3

FIVE-YEAR PROGRAMME OF EXPENDITURE UNDER ITEMISED IRRIGATION SCHEMES PROVIDING IRRIGATION FACILITIES FROM 1966 TO 1970

Cost and Expenditure Fig. in Rs. 1,000.

	Medium Scale Scheme				*Summary by Districts*										
District	*Total Acreage benefited*	*Total Estimated Cost*	*Approx. Expenditure to end of 64/65*	*Extent benefited to end of 1965*	*1965/1966*		*1966/1967*		*1967/1968*		*1968/1969*		*1969/1970*		*Remarks*
					Local	*For.*	*Local*	*For.*	*Local*	*For.*	*Local*	*For.*	*Local*	*For.*	
Kandy	174	110	45	100	15	5	30	15	—	—	—	—	—	—	
Matale	1,350	1,645	560	250	365	260	100	65	40	125	40	10	40	10	
Nuwara Eliya	416	330	130	76	55	15	40	10	35	15	20	10	—	—	
Hambantota	997	1,725	1,335	425	210	70	85	25	—	—	—	—	—	—	
Vavuniya	2,754	4,230	2,440	1,166	360	290	375	100	270	75	200	50	50	20	
Jaffna	7,303	10,130	4,760	1,500	730	1,205	790	945	700	280	575	205	215	80	
Mannar	858	1,342	835	60	175	72	130	45	65	20	—	—	—	—	
Batticaloa	7,622	10,015	4,070	158	725	690	740	1,315	725	295	605	205	360	130	
Trincomalee	16,294	33,969	29,715	14,112	535	940	470	330	380	110	170	60	100	50	
Kurunegala	532	895	696	208	98	30	55	16	—	—	—	—	—	—	
Puttalam	1,245	1,930	912	186	200	75	250	85	190	58	100	25	25	10	
Anuradhapura	3,716	5,216	3,245	2,948	665	322	538	180	165	60	30	10	—	—	
Polonnaruwa	3,483	3,665	3,270	2,307	150	35	75	15	60	15	30	15	—	—	
Badulla	3,393	7,060	3,618	807	455	265	460	207	330	160	160	90	40	10	
Moneragala	2,267	4,330	2,430	729	510	175	460	165	310	110	95	30	30	15	
Ratnapura	630	1,250	10	—	150	250	150	80	150	100	150	75	100	35	
Total	53,034	87,842	58,071	25,032	5,398	4,699	4,748	3,598	3,420	1,423	2,175	785	960	360	

STATEMENT B 4

MEDIUM SCALE SCHEMES

Five-year Programme for Provision of Irrigation Facilities under Itemised Irrigation Schemes, 1966 to 1970

Expenditure in Rs. 1,000
Extent : Numerator—Crown Land
Denominator : Private Land

65/66 S.H.	Name of Scheme	Total acreage benefited		Total Estimated Cost for Head-Works and I.FF. Rs.	Approx. Exp. to end of 64-65	Extent benefited to end of 1965		Extent to be benefited during										Remarks
								1966		1967		1968		1969		1970		
		Irrigable	Highland			I	H	I	H	I	H	I	H	I	H	I	H	
	KANDY DISTRICT																	
46	Dekinda Tank	174	—	110	45	—/100	—	—	—	74	—	—	—	—	—	—	—	
	MATALE DISTRICT																	
40	Karaugahawela Wewa	600	100	650	165	—	—	600	100	—	—	—	—	—	—	—	—	
41	Bogahawewa	150	100	130	80	100	75	50	25	—	—	—	—	—	—	—	—	
42	I. FF. Mahawatenna Tank	300	—	240	125	150	—	150	—	—	—	—	—	—	—	—	—	
43	Nabarala Wewa	100	—	195	130	—	—	100	—	—	—	—	—	—	—	—	—	
47	Wewalawewa	200	—	430	60	—	—	—	—	—	—	—	—	100	—	100	—	
	NUWARA ELIYA DISTRICT																	
45	Illukpelessa Scheme	154	—	110	90	—/76	—	78	—	—	—	—	—	—	—	—	—	
48	Keenawela Ela Anicut	262	—	220	40	—	—	—	—	100	—	115/47	—	—	—	—	—	
	HAMBANTOTA DISTRICT																	
52	Mahagalwewa	500	150	550	500	375	100	125	50	—	—	—	—	—	—	—	—	
54	Bodagama Aru Mahawewa	175	120	300	245	50	40	125	80	—	—	—	—	—	—	—	—	

58	**Karawila Tank**	175	—	600	450	—	—	154/21	—	—	—	—	—	—	—	—	—
59	**Veragoda Wewa Scheme**	80	40	125	60	—	—	80	40	—	—	—	—	—	—	—	—
62	**Katuwewa**	67	—	150	80	—	—	67	—	—	—	—	—	—	—	—	—
	VAVUNIYA DISTRICT																
78	**Thannimurippu Aug. Sch.**	1,200	400	1,750	1,380	400/700	400	100	—	—	—	—	—	—	—	—	—
85	**Udayarkaddukulam**	1,200	455	1,950	780	—	—	400	133	800	322	—	—	—	—	—	—
81	**Untharayankulam**	186	68	230	135	66	22	60	20	60	26	—	—	—	—	—	—
94	**Idaikaddukulam**	168	168	300	145	—	—	60	60	108	108	—	—	—	—	—	—
	JAFFNA DISTRICT																
79	**Akkarayankulam Scheme**	2,000	1,224	1,800	1,420	1,500	1,000	500	224	—	—	—	—	—	—	—	—
88	**Tenniyankulam Aug. Sch.**	850	384	1,550	725	—	—	300	150	300	150	140/110	84	—	—	—	—
89	**Kariyalai Nagapaduwan**	1,500	420	2,150	1,370	—	—	284/182	95	300	100	300/62	100	372	125	—	—
96	**Ambalaperumal Kulam**	600	400	1,200	225	—	—	—	—	200	133	200	133	200	134	—	—
97	**Visuvamadu Kulam**	1,200	400	1,500	525	—	—	200	66	500	166	500	168	—	—	—	—
98	**Murikandi Tank**	356	324	850	195	—	—	—	—	—	—	100	100	100/29	100	127	124
99	**Maruthan Kulam**	167	112	330	35	—	—	—	—	—	—	67	45	100	67	—	—
87	**Vannerikulam**	230	153	300	110	—	—	—	—	100	66	130	87	—	—	—	—
90	**Koddaikaddinakulam**	400	400	450	155	—	—	100	100	200	200	100	100	—	—	—	—

STATEMENT B 4—(contd.)

MEDIUM SCALE SCHEMES

Five-pear Programme for Provision of Irrigatian Facilities under Itemised Irrigation Schemes, 1966 to 1970

Cost & Expenditure Fig. in Rs. 1,000

65/66 S.H.	Name of Scheme	Total acreage benefited		Total Estimated Cost for Head-Works and I.FF.	Approx. Exp. to end of 64/65	Extent benefited to end of 1965		Extent to be benefited during												Remarks
								1966		1967		1968		1969		1970		
		Irrigable	Highland			I.	H	I.	H	I.	H	I	H	I.	H	I	H	
	MANNAR DISTRICT																	
93	Kurai Tank	500	218	850	490	—	—	200	100	127/173	118	—	—	—	—	—	—	
82	Viyaddikulam	136	132	240	140	—	—	52/4	52	80	80	—	—	—	—	—	—	
83	Kurunthankulam	114	54	172	140	—/60	—	54	54	—	—	—	—	—	—	—	—	
95	Chiratikulam	108	16	80	65	—	—	16/92	16	—	—	—	—	—	—	—	—	
	BATTICALOA DISTRICT																	
104	Unmichchai R.L.Chl.Ext. Scheme	2,162	—	1,100	780	—	—	—	—	1,000	—	1,162	—	—	—	—	—	
106	Henanegalakandiya Tank	600	400	1,250	300	—	—	—	—	100	66	200	133	200	133	100	68	
107	Kitulwewa Tank	800	400	1,400	700	—	—	100	50	200	100	300	150	200	100	—	—	
113	Punani Anicut R.B.Scheme	1,550	—	1,700	95	—	—	—	—	—	—	500	—	500	—	550	—	
105	Wedamunawewa Scheme	408	280	670	415	108	72	100	66	200	142	—	—	—	—	—	—	
109	Iddapola Anicut Schemes	200	40	200	75	—	—	60	—	—	—	140	40	—	—	—	—	
110	Talpitiya Oya Anicut	200	132	185	110	—	—	50	33	150	99	—	—	—	—	—	—	

111 Annasuddukattukulam Scheme	310	82	360	255	50	—	100	50	99/61	32	—	—	—	—	—	—
114 Restoration of Kaddumuruvukulam Scheme	400	426	1,250	520	—	—	—	—	100	100	200	200	100	126	—	—
116 Muthurankerni Tank Scheme	400	134	800	190	—	—	—	—	—	—	100	33	150	50	150	51
117 Kirimachchikulam Scheme	250	145	500	180	—	—	—	—	100	66	105/45	79	—	—	—	—
103 Weligahakandiya Tank	342	113	600	450	—	—	—	—	150	50	192	63	—	—	—	—
TRINCOMALEE DISTRICT																
121 Kantalai Aug. Scheme—																
(i) Galmetiyawa I.FF.	600	107	19,500	16,450	300	50	300	57	— 300	— 150	— 500	— 250	— 200	— 114	— —	— —
(ii) Wan Ela Scheme	1,000	514														
124 Neelapanikkankulam Scheme	600	—	240	90	—/312	—	—	—	188	—	100	—	—	—	—	—
122 Allai Extension Scheme	14,000	4,666	14,119	13,100	6,800/6,700	4,666	500	—	—	—	—	—	—	—	—	—
125 Vepan Kulam	94	—	100	75	—	—	94	—	—	—	—	—	—	—	—	—
KURUNEGALA DISTRICT																
130 Maha Andarawa Tank	344	280	580	469	120	120	160/64	160	—	—	—	—	—	—	—	—
140 Horrow Wewa	100	70	185	120	—	—	100	70	—	—	—	—	—	—	—	—
141 Bakmigalla Tank	88	70	130	107	88	70	—	—	—	—	—	—	—	—	—	—
PUTTALAM DISTRICT																
142 Tabbowa Tank R. B. Ch'. Ext. Scheme	500	500	500	—	—	—	—	—	—	—	200	200	300	300	—	—
134 Pahariya Tank	360	360	620	442	60	60	200	200	100	100	—	—	—	—	—	—
136 Villuke Tank	126	66	300	245	66/60	66	—	—	—	—	—	—	—	—	—	—
137 Pandiyamadu Tank	149	112	400	220	—	—	—	—	—	—	112/37	112	—	—	—	—
143 Alibahina Mankaduwa Scheme	110	—	110	5	—	—	—	—	—/110	—	—	—	—	—	—	—

STATEMENT B 4—(*contd.*)

MEDIUM SCALE SCHEMES

Five-year Programme for Provision of Irrigation Facilities under Itemised Irrigation Schemes, 1966 to 1970

Expenditure in Rs. 1,000
Extent : Numerator—Crown Land
Denominator—Private Land

65/66 S.H.	Name of Scheme	Total acreage benefited		Total Estimated Cost for Head Works and I.FF.	Approx. Exp. to end of 64/65	Extent benefited to end of 1965		Extent to be benefited during										Remarks
								1966		1967		1968		1969		1970		
		Irrigable	Highland			I	H	I	H	I	H	I	H	I	H	I	H	
	ANURADHAPURA DISTRICT																	
138	Angamuwa Tank Scheme	2,500	1,666	3,700	2,600	2,500	1,666	—	—	—	—	—	—	—	—	—	—	
148	Mahawawalkadawala Tank	185	56	188.5	95	50/92	—	10/33	56	—	—	—	—	—	—	—	—	
149	Ihalakalankutiya Tank	239	182	260	125	82/39	82	—	—	100/18	100	—	—	—	—	—	—	
155	Makichchawa Tank	110	72	180	125	—	—	96/14	72	—	—	—	—	—	—	—	—	
157	Tawalam Hammillewa	200	82	280	120	—	—	100	41	100	41	—	—	—	—	—	—	
165	Improvements to Parangiyawadiya Tank	150	150	210	75	—	—	—	23	50	127	100	—	—	—	—	—	
167	Ambagaswewa Scheme	207	22	147.5	105	185	—	22	22	—	—	—	—	—	—	—	—	
175	Extension to Halpen Ela	125	125	250	—	—	—	—	50	50	75	75	—	—	—	—	—	
	POLONNARUWA DISTRICT																	
178	Gal Amuna Scheme	3,056	1,910	3,200	2,930	2,307	1,535	—	—	749	375	—	—	—	—	—	—	
188	Gallinda Mahawewa Scheme	171	114	225	180	—	—	71	47	100	67	—	—	—	—	—	—	
186	Makulkella Wewa Scheme	106	—	165	140	—	—	106	—	—	—	—	—	—	—	—	—	

191	I. FF. to Purana Fields under Parakrama Samudra Scheme	150	—	75	20	—	—	150	—	—	—	—	—	—	—	—	—
	BADULLA DISTRICT																
209	Dambarawa Scheme	1,056	622	3,810	2 200	$\frac{516}{54}$	516	100	106	$\frac{180}{206}$	—	—	—	—	—	—	—
212	Ambawela Reservoir Scheme	1,000	451	1,500	650	—	—	—	—	—	—	500	250	500	201	—	—
217	Hambegamuwa St. II	675	381	500	195	$\frac{—}{294}$	—	—	—	100	100	150	150	131	131	—	—
223	I.FF. to Maha Eliya Scheme	691	362	180	—	$\frac{—}{237}$	—	100	150	$\frac{107}{247}$	12	—	—	—	—	—	—
203	Magandara Oya Anicut	200	126	290	265	$\frac{101}{74}$	101	25	25	—	—	—	—	—	—	—	—
207	Hulandawa Anicut	389	389	1,300	1,050	224	224	139	139	26	26	—	—	—	—	—	—
208	Batathuhena Anicut	100	100	240	190	—	—	50	50	50	50	—	—	—	—	—	—
210	Keragoda Tank	102	102	200	163	—	—	50	50	52	52	—	—	—	—	—	—
211	Namal Oya Anicut	100	—	260	150	36	—	64	—	—	—	—	—	—	—	—	—
214	Thenagalkanda Wewa	120	120	200	75	—	—	—	—	50	50	70	70	—	—	—	—
216	Halmillapillawa Tank	237	—	550	290	—	—	50	—	187	—	—	—	—	—	—	—
218	Lunugala Yoda Wewa	85	—	350	185	—	—	—	—	$\frac{55}{30}$	—	—	—	—	—	—	—
219	Ginnoruwa Tank	94	78	130	65	—	—	—	—	$\frac{50}{44}$	78	—	—	—	—	—	—
220	Dambawewa Tank	230	230	560	220	—	—	50	50	180	180	—	—	—	—	—	—
225	Monarawana Anicut	231	115	320	—	—	—	—	—	100	50	131	65	—	—	—	—
215	Mahatotilla Scheme	350	70	1,000	350	—	—	—	—	$\frac{—}{100}$	—	$\frac{70}{180}$	70	—	—	—	—
	RATNAPURA DISTRICT																
229	Uggalkaltota R. B. Chl. Extension	630	157	1,250	10	—	—	—	—	100	25	200	50	330	82	—	—

STATEMENT B 5

PROGRAMME OF DEVELOPMENT UNDER IRRIGATION PROJECTS WHICH CAN BE IMPLEMENTED DURING THE FIVE-YEAR PERIOD, 1966–1970

Cost in Rs. 1,000.

Name of Scheme	Estimated Cost			Acreage bene-fited	Estimated Expenditure and Extent to be provided with I.FF.														
					1966			1967			1968			1969			1970		
	Loc. Rs.	For. Rs.	Total Rs.		Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.	Loc. Rs.	For. Rs.	Acs.
COLOMBO DISTRICT																			
1. Const. of Anicut across Dandugam Oya at Opatha	138	120	258	— 250	—	—	—	50	50	—	50	50	— 150	38	20	— 100	—	—	—
HAMBANTOTA DISTRICT	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
JAFFNA DISTRICT																			
2. Restoration of Periyakulam	800	300	1,100	— 3,000	—	—	—	50	25	—	200	100	—	200	50	— 500	200	50	— 1,000
3. Restoration of Perumkulam	225	140	365	200	—	—	—	50	25	—	60	90	—	60	15	100	55	10	100
MANNAR DISTRICT																			
4. Restoration of Kollam Velankulam	200	65	265	200	—	—	—	50	25	—	75	25	—	50	10	100	25	5	100
MATALE DISTRICT																			
5. Loluwela Dorawela Anicut Scheme	190	35	225	350	—	—	—	50	10	—	50	10	100	50	10	125	40	5	125
6. Ma-Oya Wewa Scheme	460	400	860	310	—	—	—	50	25	—	100	175	—	100	25	100	100	25	100
BATTICALOA DISTRICT																			
7. Lahugala Aug. Scheme	570	600	1,170	500 450	—	—	—	50	25	—	100	—	—	100	100	—	100	25	100 450

8. Const. of Anicut across Lavanai	60	40	100	200	—	—	—	20	15	—	25	15	100	15	10	100	—	—	—
9. Rest. of Kunchan Kallukulam	120	85	205	200	—	—	—	35	15	—	45	60	—	40	10	200	—	—	—
10. Rest. of Meiyangoda Tank	200	145	345	165	—	—	—	40	20	—	50	100	—	50	15	65	60	10	100
TRINCOMALEE DISTRICT																			
11. Per Aru Anicut Scheme	600	400	1,000	300 545	—	—	—	70	30	—	100	150	—	100	70	—	100	30	100 200
PUTTALAM DISTRICT																			
12. Tabbowa Tank Aug. Scheme	600	900	1,500	500	—	—	—	100	180	—	200	350	—	200	250	—	80	80	500
POLONNARUWA DISTRICT																			
13. Kadawatamadu Tank	200	135	335	250	—	—	—	50	20	—	75	90	50	40	15	100	35	10	100
BADULLA DISTRICT	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MONARAGALA DISTRICT																			
14. Restoration of Elhena Wewa	200	225	425	124	—	—	—	40	35	—	60	175	—	60	10	50	40	5	74
MATALE DISTRICT																			
15. Kandalama Scheme St. II	410	140	550	1,000	—	—	—	300	140	—	50	—	—	50	—	1,000	10	—	—
NUWARA ELIYA DISTRICT																			
16. Paragaha Arawe Amuna	370	100	470	300	—	—	—	245	90	—	50	10	—	50	—	—	25	—	300
MANNAR DISTRICT																			
17. Mulli Kulam	510	250	760	375	—	—	—	350	150	—	55	25	—	50	25	100	55	50	275
BATTICALOA DISTRICT																			
13. Augmentation of Pulugamuwa	950	300	1,250	— 4,120	—	—	—	75	—	—	75	50	—	400	200	— 2,000	350	50	— 2,120

STATEMENT B 5—(*Contd.*)

PROGRAMME OF DEVELOPMENT UNDER IRRIGATION PROJECTS WHICH CAN BE IMPLEMENTED DURING THE FIVE-YEAR PERIOD, 1966–1970

Cost in Rs. 1,000

Name of Scheme	*Estimated Cost*			*Acreage bene-fited*	*Estimated Expenditure and Extent to be provided with I.FF.*														
					1966			*1967*			*1968*			*1969*			*1970*		
	Loc. Rs.	*For.* Rs.	*Acs.* Rs.		*Loc.* Rs.	*For.* Rs.	*Acs.* Rs.	*Loc.* Rs.	*For.* Rs.	*Acs.* Rs.	*Loc.* Rs.	*For.* Rs.	*Acs.* Rs.	*Loc.* Rs.	*For.* Rs.	*Acs.* Rs.	*Loc.* Rs.	*For.* Rs.	*Acs.* Rs.
TRINCOMALEE DISTRICT																			
19. Yan Oya Anicut	1,000	500	1,500	1,400	—	—	—	—	—	—	—	—	—	—	—	—	50	500	—
KURUNEGALA DISTRICT																			
20. Manningamuwa Wewa	80	30	110	55	—	—	—	—	—	—	—	—	—	10	10	—	70	20	55
21. Welikambura Anicut	130	40	170	210	—	—	—	—	—	—	—	—	—	40	20	—	90	20	210
PUTTALAM DISTRICT																			
22. Maha Karambawe	155	45	200	105	—	—	—	—	—	—	—	—	—	50	10	—	105	35	105
ANURADHAPURA DISTRICT																			
23. Galapitawewa	165	45	210	145	—	—	—	—	—	—	—	—	—	47	15	—	118	30	145
POLONNARUWA DISTRICT																			
24. Elle Wewa	190	70	260	200	—	—	—	—	—	—	—	—	—	50	50	—	140	20	200
25. Iththapachchigoda Scheme	60	20	80	60	—	—	—	—	—	—	—	—	—	20	20	—	40	—	60
BADULLA DISTRICT																			
26. Yakgalakandura Amuna	82	30	112	150	—	—	—	—	—	—	—	—	—	50	10	—	32	20	150
MONERAGALA DISTRICT																			
27. Sudupanawila Extension	290	100	390	400	—	—	—	200	45	—	30	25	—	30	30	400	30	—	—
RATNAPURA DISTRICT																			
28. Weli Oya Anicut	275	75	350	1,000	—	—	—	125	75	—	50	—	—	50	—	500	50	—	500
Total	9,230	5,335	14,565	8,699 8,365	—	—	—	2,000	1,000	—	1,500	1,500	250 150	2,000	1,000	2,940 2,600	2,000	1,000	3,399 3,770

STATEMENT B 6

FIVE-YEAR PROGRAMME OF EXPENDITURE UNDER ITEMISED IRRIGATION SCHEMES PROVIDING IRRIGATION FACILITIES FROM 1966 TO 1970

Cost & Expenditure Fig. in Rs. 1,000

65/66 S. H.	Name of Scheme	Total acreage benefited	Total Estimated Cost	Approx: Expenditure to end 64/65	Extent benefited to end of 1965	Programme 1965–66 Local	Programme 1965–66 Foreign	1966–67 Local	1966–67 Foreign	1967–68 Local	1967–68 Foreign	1968–69 Local	1968–69 Foreign	1969–70 Local	1969–70 Foreign	Remarks
	KANDY DISTRICT															
46	**Dekinde Wewa**	174	110	45	100	15	5	30	15	—	—	—	—	—	—	
	MATALE DISTRICT															
40	**Karaugahawela Wewa**	600	650	165	—	200	185	60	40	—	—	—	—	—	—	
43	**Nabarala Wewa**	100	195	130	—	35	15	10	5	—	—	—	—	—	—	
47	**Wewalawewa Scheme**	200	430	60	—	15	10	30	20	40	125	40	10	40	10	To continue
41	**Bogahawewa**	150	130	80	100	40	10	—	—	—	—	—	—	—	—	
42	**I.FF Mahawatenna Tank**	300	240	125	150	75	40	—	—	—	—	—	—	—	—	
	NUWARA-ELIYA DISTRICT															
45	**Illukpelessa Scheme**	154	110	90	76	15	5	—	—	—	—	—	—	—	—	
48	**Keenawela Ela Scheme**	262	220	40	—	40	10	40	10	35	15	20	10	—	—	
	HAMBANTOTA DISTRICT															
52	**Mahagal Wewa**	500	550	500	375	40	10	—	—	—	—	—	—	—	—	
54	**Bodagama Ara Mahawewa**	175	300	245	50	25	10	15	5	—	—	—	—	—	—	
58	**Karawila Tank**	175	600	450	—	70	30	40	10	—	—	—	—	—	—	
59	**Veheragoda Wewa Scheme**	80	125	60	—	35	10	15	5	—	—	—	—	—	—	
62	**Katuwewa**	67	150	80	—	40	10	15	5	—	—	—	—	—	—	
	VAVUNIYA DISTRICT															
78	**Thannimurippu Aug. Sch.**	1,200	1,750	1,380	1,100	60	90	100	25	70	25	—	—	—	—	
85	**Udayarkaddu Kulam**	1,200	1,950	780	—	200	150	200	50	200	50	200	50	50	20	
81	**Untharayan Kulam**	186	230	135	66	40	10	35	10	—	—	—	—	—	—	
94	**Idaikaddu Kulam**	168	300	145	—	60	40	40	15	—	—	—	—	—	—	

STATEMENT B6—(*contd.*)

FIVE-YEAR PROGRAMME OF EXPENDITURE UNDER ITEMISED IRRIGATION SCHEMES PROVIDING IRRIGATION FACILITIES FROM 1966 TO 1970

Cost & Expenditure Fig. in Rs. 1,000

65/66 S. H.	*Name of Scheme*	*Total acreage benefited*	*Total Estimated Cost*	*Approx: Expenditure to end 64/65*	*Extent benefited to end of 1965*	*Programme 1965–66*		*1966–67*		*1967–68*		*1968–69*		*1969–70*		*Remarks*
						Local	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	
	JAFFNA DISTRICT															
79	Akkarayankulam Scheme	2,000	1,800	1,420	1,500	150	50	100	40	30	10	—	—	—	—	
88	Tenniyankulam Aug. Sch.	850	1,550	725	—	150	100	150	50	150	50	100	25	40	10	
89	Kariyalainagapaduwan	1,500	2,150	1,370	—	100	200	100	50	100	50	100	50	20	10	
96	Ambalaperumal Kulam	600	1,200	225	—	100	450	100	50	100	20	100	20	25	10	
97	Viswamadu Kulam	1,200	1,500	525	—	50	350	100	450	100	100	100	50	50	25	Est. to be revised
98	Murukandy Tank	356	850	195	—	40	10	100	200	80	20	60	20	60	20	
99	Maruthan Kulam	167	330	35	—	40	10	40	80	40	10	40	10	20	5	
87	Vannerikulam	230	300	110	—	40	10	40	10	40	10	30	10	—	—	
90	Koddaikaddinakulam	400	450	155	—	60	25	60	15	60	10	45	20	—	—	
	MANNAR DISTRICT															
93	Kurai Tank	500	850	490	—	100	50	100	25	65	20	—	—	—	—	
82	Viyddi Kulam	136	240	140	—	40	10	30	20	—	—	—	—	—	—	
83	Kuranthan Kulam	114	172	140	60	25	7	—	—	—	—	—	—	—	—	
95	Chitratikulam	108	80	65	—	10	5	—	—	—	—	—	—	—	—	
	BATTICALOA DISTRICT															
104	Unnichchai R. B. Chl. Ext.	2,162	1,100	780	—	50	30	50	30	60	20	50	30	—	—	
106	Henanegalkandiya Tank	600	1,250	300	—	100	300	100	100	100	30	100	30	60	30	
107	Kitulwewa Tank	800	1,400	700	—	100	100	100	75	100	50	100	25	40	10	
113	Punanai Anicut R.B.Sch.	1,550	1,700	95	—	100	100	150	500	150	50	150	50	150	50	To continue
105	Wadamunawewa Scheme	408	670	415	108	60	25	60	25	60	25	—	—	—	—	
109	Iddapola Anicut Scheme	200	200	75	—	40	10	10	5	25	10	20	5	—	—	
110	Talpitiya Oya Anicut	200	185	110	—	30	10	25	10	—	—	—	—	—	—	
111	Annasuddukaddu Kulam	310	360	255	50	30	10	30	10	15	10	—	—	—	—	
114	Restoration of Kaddumuruvu Kulam	400	1,250	520	—	75	25	75	250	75	50	75	25	60	20	

116	Mathurankerni Tank	400	800	190	—	50	50	50	250	50	20	50	20	50	20
117	Kirimachchi Kulam	250	500	180	—	50	20	50	50	60	20	50	20	—	—
103	Weligahakandiya Tank	342	600	450	—	40	10	40	10	30	10	10	—	—	—
	TRINCOMALEE DISTRICT														
121	Kantalai Aug. Scheme	—	19,500	16,450	—	—	—	—	—	—	—	—	—	—	—
	(i) Galmetiyawa I.FF.	600	—	—	300	125	25	40	20	—	—	—	—	—	—
	(ii) Wan Ela	1,000	—	—	—	150	600	200	200	200	50	150	50	100	50
124	Neelapanikkankulam	600	240	90	312	35	5	30	10	30	10	20	10	—	—
122	Allai Extension Scheme	14,000	14,119	13,100	13,500	200	300	200	100	150	50	—	—	—	—
125	Veppankulam	94	110	75	—	25	10	—	—	—	—	—	—	—	—
	KURUNEGALA DISTRICT														
130	Maha Andarawa Tank	344	580	469	120	45	15	40	11	—	—	—	—	—	—
140	Horrow Wewa	100	185	120	—	35	10	15	5	—	—	—	—	—	—
141	Bokungalla Tank	88	130	107	88	18	5	—	—	—	—	—	—	—	—
	PUTTALAM DISTRICT														
142	Tabbowa Tank R.B. Chl.	500	500	—	—	70	30	100	20	100	20	100	25	25	10
134	Pahariya Tank Scheme	360	620	442	60	50	20	60	20	20	8	—	—	—	—
136	Restoration of Villuke Tank	126	300	245	126	40	15	—	—	—	—	—	—	—	—
137	Pandiyamadu Tank Sch.	149	400	220	—	—	—	50	30	70	30	—	—	—	—
143	Alibahina Mankaduwa Scheme	110	110	5	—	40	10	40	15	—	—	—	—	—	—
	ANURADHAPURA DISTRICT														
138	Angamuwa Tank Scheme	2,500	3,700	2,600	2,500	400	200	300	100	75	25	—	—	—	—
148	Mahawewelkadawela	185	188.5	95	142	50	15	23	5	—	—	—	—	—	—
149	Ihalakalankuliya scheme	239	260	125	121	40	10	50	20	10	5	—	—	—	—
155	Mekichchawa Tank	110	180	125	—	20	35	—	—	—	—	—	—	—	—
157	Tavalam Hamillewa	200	280	120	—	50	25	50	20	10	5	—	—	—	—
167	Ambagahawewa	207	147.5	105	185	30	12	—	—	—	—	—	—	—	—
175	Halpan Ela Extension	125	250	—	—	40	10	75	25	50	10	30	10	—	—
165	Impts. to Parangiyawadiya	150	210	75	—	35	15	40	10	20	15	—	—	—	—
	POLONNARUWA DISTRICT														
178	Gal Amuna	3,056	3,200	2,930	2,307	60	15	60	15	60	15	30	15	—	—
188	Gallinda Maha Wewa	171	225	180	—	25	5	15	—	—	—	—	—	—	—
186	Makulkella Wewa	106	165	140	—	20	5	—	—	—	—	—	—	—	—
191	I.FF to Purana Fields Parakrama Samudra Scheme	150	75	20	—	45	10	—	—	—	—	—	—	—	—

STATEMENT B6—(*contd.*)

FIVE-YEAR PROGRAMME OF EXPENDITURE UNDER ITEMISED IRRIGATION SCHEMES PROVIDING IRRIGATION FACILITIES FROM 1966 TO 1970

Cost & Expenditure Fig. in Rs. 1,000

65/66 S. H.	*Name of Scheme*	*Total acreage benefited*	*Total Estimated Cost*	*Approx: Expenditure to end of 64/65*	*Extent benefited to end of 1965*	*Programme*										*Remarks*
						1965/66		1966/67		1967/68		1968/69		1969/70		
						Local	*Foreign*	*Local*	*Foreign*	*Loca*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	
	BADULLA DISTRICT															
209	Dambarawe Scheme	1,056	3,810	2,200	570	100	50	125	25	100	50	—	—	—	—	
212	Ambawela R.B. Scheme	1,000	1,500	650	—	150	100	150	100	100	50	100	50	40	10	
223	I.FF to Maha Eliya Sch.	691	180	—	237	40	40	40	20	30	10	—	—	—	—	
208	Batatuhena Anicut	100	240	190	—	20	10	10	5	—	—	—	—	—	—	
210	Keragoda Tank	102	200	163	—	20	5	10	2	—	—	—	—	—	—	
219	Ginnoruwa Tank	94	130	65	—	25	10	25	5	—	—	—	—	—	—	
215	Mahatotilla Scheme	350	1,000	350	—	100	50	100	50	100	50	60	40	—	—	
	MONARAGALA DISTRICT															
217	Hambegama Stage II	675	500	195	294	50	10	50	20	50	10	50	20	30	15	
203	Magandara Oya Anicut	200	290	265	175	20	5	—	—	—	—	—	—	—	—	
207	Hulanda Oya Anicut	389	1,300	1,050	224	80	20	80	20	30	20	—	—	—	—	
211	Namal Oya Anicut	100	260	150	36	60	15	25	10	—	—	—	—	—	—	
214	Thenagalkande wewa	120	200	75	—	30	10	35	10	30	10	—	—	—	—	
216	Halmillapillewa Tank	237	550	290	—	70	30	70	30	45	15	—	—	—	—	
218	Lunugala Yoda Wewa	85	350	185	—	50	20	50	15	20	10	—	—	—	—	
220	Dambawewa Tank	230	560	220	—	90	25	90	35	75	25	—	—	—	—	
225	Monarawa Amuna	231	320	—	—	60	40	60	25	60	20	45	10	—	—	
	RATNAPURA DISTRICT															
229	Uggalkaltota R.B. Chl. Extension	630	1,250	10	—	150	250	150	80	150	100	150	75	100	35	

STATEMENT CI

FIVE-YEAR PROGRAMME FOR PROVISION OF IRRIGATION FACILITIES—VILLAGE WORKS—1966—1970

Summary

Expenditure in Rs. 1,000

Acreage	*Expenditure 1966*			Acres	*Expenditure 1967*			Acres	*Expenditure 1968*			Acres	*Expenditure 1969*			Acres	*Expenditure 1970*			*Remarks*
	Foreign	*Local*	*Total*		*Foreign*	*Local*	*Total*		*Foreign*	*Local*	*Total*		*Foreign*	*Local*	*Total*		*Foreign*	*Local*	*Total*	
5,476	840	1,868	2,708	8,755	1,545	3,518	5,063	13,206	2,000	4,537	6,537	12,505	1,710	3,827	5,537	10,091	1,825	3,826	5,651	

TOTAL ACREAGE FOR FIVE YEARS : 50,000 AC.

TOTAL EXPENDITURE
Expenditure to end of 1965 : 1,643,000
Foreign : 7,920,000
Local : 17,576,000
Total : 27,139,000

N. B.—This programme can be kept only if the Machinery requirement is supplied.

Note.—50,000 Acres of Land are made up of 13,500 Ac. of New Land and 36,500 Ac. of existing paddy land with improved Irrigation facilities for better yield.

STATEMENT C 2

FIVE-YEAR PROGRAMME FOR PROVISION OF IRRIGATION FACILITIES—VILLAGE WORKS—1966-1970—SUMMARY BY DISTRICTS

Name of District	Total				Extent to be supplied with irrigation facilities 1966			1967			1968			1969			1970		
	Exis. Acs.	New Acs.	Total Acs.	Estd. Cost	Exis. Acs.	New Acs.	Total Acs.	Exis. Acs.	New Acs.	Total Acs.	Exis. Acs.	New Acs.	Total Acs.	Exis. Acs.	New Acs.	Total Acs.	Exis. Acs.	New Acs.	Total Acs.
Colombo	3,689	105	3,794	1,455	520	—	520	478	39	517	1,189	66	1,255	887	—	887	615	—	615
Kalutara	3,425	20	3,445	1,146	386	20	406	488	—	488	1,063	—	1,063	731	—	731	757	—	757
Ratnapura	1,084	50	1,134	432	165	—	165	269	—	269	200	—	200	283	—	283	167	50	217
Kegalle	888	—	888	313	208	—	208	181	—	181	201	—	201	228	—	228	70	—	70
Kurunegala	6,436	514	6,950	2,511	375	—	375	992	164	1,156	1,446	261	1,707	1,602	89	1,691	2,021	—	2,021
Puttalam	2,259	191	2,450	687	482	75	557	382	116	498	585	—	585	515	—	515	295	—	295
Anuradhapura	5,916	2,625	8,541	4,842	578	225	803	656	423	1,079	1,410	595	2,005	1,509	676	2,185	1,763	706	2,469
Polonnaruwa	123	2,173	2,296	1,104	—	375	375	—	428	428	—	566	566	—	526	526	123	278	401
Kandy	1,171	287	1,458	558	295	—	295	283	56	339	312	121	433	193	—	193	88	110	198
Matale	934	1,439	2,373	1,378	112	85	197	138	195	333	312	295	607	213	386	599	159	478	637
Nuwara Eliya	1,106	163	1,269	477	123	50	173	262	30	292	378	33	411	343	50	393	—	—	—
Badulla	1,360	462	1,822	614	32	14	46	260	136	396	408	72	480	260	240	500	400	—	400
Moneragala	208	695	903	962	33	—	33	75	50	125	—	175	175	—	240	240	100	230	330
Galle	1,146	—	1,146	562	160	—	160	283	—	283	335	—	335	276	—	276	92	—	92
Hambantota	833	874	1,707	1,396	75	50	125	70	130	200	—	212	212	285	322	607	403	160	563
Matara	3,082	—	3,082	492	95	—	95	400	—	400	1,087	—	1,087	1,100	—	1,100	400	—	400
Jaffna	160	535	695	805	—	55	55	160	110	270	—	230	230	—	140	140	—	—	—
Mannar	427	326	753	534	27	100	127	—	126	126	150	100	250	250	—	250	—	—	—
Vavuniya	390	961	1,351	905	95	247	342	155	357	512	140	237	377	—	60	60	—	60	60
Batticaloa	631	610	1,241	789	—	100	100	—	200	200	200	170	370	200	140	340	231	—	231
Amparai	855	370	1,225	865	—	—	—	325	—	325	80	170	250	250	200	450	200	—	200
Trincomalee	393	1,117	1,510	1,312	—	319	319	263	75	338	64	343	407	66	245	311	—	135	135
New Schemes	—	—	—	3,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	36,516	13,517	50,033	27,139	3,761	1,715	5,476	6,120	2,635	8,755	9,560	3,646	13,206	9,191	3,314	12,505	7,884	2,207	10,091

CHAPTER IV

DRAINAGE AND RECLAMATION OF LOW LYING LANDS ALONG THE WEST AND SOUTH-WEST COAST OF CEYLON

1. The West and South West sector of the Island cover the Districts of Colombo, Kalutara and Galle and falls in the Wet Zone Sector. Here both climate and rainfall are most favourable for cultivation. The land is extensively planted with Tea, Rubber and Coconut. Paddy too is cultivated in the river valleys and the river deltas, but exposed to hazards arising from floods and drainage. The total land mass in this zone is about 3.76 million acres and of this area about 2.9 million acres or 75% of the entire area is developed. The balance is mostly wet zone forests, in the upper reaches, and marshes and lagoons along the coastal belt. The forests are a source of national wealth. The marsh lands, and the surrounding paddy lands which are poorly cultivated, cover an extent of about 50,000 acres in the west and south-west area. These lands suffer from both flooding and salinity due to the sea water which enters during high tide. These remain to be developed on a scale more intensified and much bigger than attempted by the Government in the past primarily to supplement the rice production necessary to meet the country's needs, and secondly to ease the unemployment problem of the many families already living in these areas. Many of them own small extents of these unproductive lands in the area itself.

2. In the Wet Zone, the rainfall received during the south-west monsoon is greater than that received during the inter-monsoonal period or the north-east monsoon. The annual average rainfall generally ranges from 200 inches to 75 inches.

The following rivers have their exit along the West and South-West coast :—

		Square Miles
(1) Kelani Ganga—Catchment Area		885
(2) Kalu Ganga	do.	1,050
(3) Bentota Ganga	do.	243
(4) Gin Ganga	do.	370
(5) Nilwala Ganga	do.	375
(6) Attanagalu Oya	do.	284
(7) Maha Oya	do.	590
(8) Deduru Oya	do.	1,022

3. During times of flood, these rivers overflow the banks, particularly in the lower reaches, and spread and inundate large extents of the adjoining low lying coastal lands, except where adequate protection works exist.

Sand bank formation at the river mouth and the meandering course of the river aggravate this situation.

4. The flood waters either find their way out to the sea through secondary outlets or stagnate until it can drain back to the river as the floods subside.

5. The flood control works along the bank of the main rivers which form the boundaries of each unit of low lying land is important and a necessary consideration in the overall plan of reclamation and drainage.

6. In addition to the larger rivers, are the smaller ones, including the natural and artificial waterways and outlets. In the first type come the natural streams draining out to the sea. These have their outfalls generally close to the promontaries and the rock out-crops that project from the land out into the sea. In the second type, to begin with come the ancient canal system constructed during the Dutch period. These waterways exist even today but are far from being in a satisfactory condition to serve either the purpose of navigation or as the main inland drainage channel very necessary, to effectively drain the low lying lands. These waterways are badly silted, and covered by vegetation including the water plants " Salvinia " and " Water Hyacinth " the eradication of which continues to be a major problem. The desilting of the Dutch Canals was dropped by the P. W. D. after the First World War as the development of road transport rendered these canals useless for transport purposes.

The problems and their solutions

7. The problems of reclaiming the abandoned marsh lands for paddy or improving the condition of the lands now poorly cultivated arise from the following :—

(*a*) Flooding

(*b*) Difficulties in drainage

(*c*) Salinity

Flooding

8. The answer to flooding, involves firstly the isolation of the area from the flood waters of the adjoining rivers. This first step has been already achieved in respect of two units of low lying land. One is the unit between Kelani Ganga and Kaluganga, and the other is the one between Kelani Ganga and Attanagalu Oya. In respect of the units adjoining the other major rivers partial protection does exist.

9. Secondly the answer to flooding lies in keeping the outlets draining the protected area, free from the major problem of sand bar formation at the river mouth, to enable the continuous discharge of drainage water, particularly during the period of comparatively dry weather. The construction of groynes at river mouths has proved to be most effective. Their actual design has to be based more on field experience, and observations on models. A degree of caution is absolutely essential particularly in the selection of the outfall sites.

10. The following is an extract from the chapter on 'Harbours and Docks' Civil Engineering Reference book (Editor J. Comrie—Vol. IV—1961) on this point :—

"Generally there is little precision in maritime work and there is probably no other branch of the proposition in which experience of judgement play so important a part. Waves can be analysed on a mathematical basis for ideal conditions but in practice so many variables are possible—speed, direction and duration of wind, slope and nature of sea bed, configuration of coast line—that not much more than broad inferences can be drawn from theoretical considerations. Littoral drifts, currents and siltation may be observed and measured for an existing set of conditions but there is no exac way of calculating the effect on these likely to result from a change in conditions brought about by a proposed new work. Models would appear to offer the approach to this particular problem, but the question of scale, especially the ratio of length to depth, is still a matter of some uncertainity".

"Siltation is of primary importance in maintaining a harbour and the layout must take account of this. The windward break water accordingly is usually made to extend beyond the line of the opposite leeward one, and the two curve in towards each other. The object of this is to keep the current across the entrance to a minimum and to ensure that the littoral drift does not get trapped by the leeward breakwater. It frequently happens that the exact alignments of the ends of the breakwaters are adjusted on site as the actual consequences of the new works become apparent".

11. The Irrigation Department has carried out the construction of about nine out-fall works of different types, over the past 30 years. These vary in shape and form, from the one at Kaikawala constructed about 1935 to most recent one at Maduganga completed in 1964. In the former the exit is through a gap cut through the rock outcrop which projects into the sea, and connects the low lying land through a diversion canal. The latter takes the form of two breakwaters at the mouth of the river which drains the low land. This also provides facilities for the anchorage of fishing craft, and thus serves as a Fishing Habour.

12. In the planning and design of outfalls, the experience gained from the works already done, has been one useful guide in the design and construction of future works. The aerial photographs revealing the nature of the foreshore at the proposed sites have also been of special value in foundation studies.

13. The availability of rock required for the construction of the jetties is another important factor that had to be given consideration. The availability of rock outcrops, and reefs, along the coast, as well as rock quarries become more and more scarce towards the North. The dry weather flow too decreases. These circumstances would therefore not justify the construction of as many outfall works in the Northern Sector as in the South West. The drop in rainfall too supports this view.

AVERAGE ANNUAL RAINFALL IN STATIONS ALONG THE WESTERN COAST

Month	*Puttalam*	*Chilaw*	*Negombo*	*Colombo*	*Panadura*	*Kalutara*	*Galle*	*Tangalle*	*Hambantota*	*Tissamaharama*
January	3.47	3.15	2.91	3.97	4.85	4.82	3.84	3.07	4.03	4.45
February	1.34	1.40	2.00	2.65	2.75	3.56	3.24	1.65	1.43	1.36
March	3.11	4.14	4.87	4.62	6.37	6.52	5.31	3.98	3.34	3.75
April	4.86	6.11	9.09	9.06	11.30	12.45	8.74	4.43	3.87	4.01
May	9.73	7.15	10.82	15.51	16.75	17.65	12.72	7.39	4.27	3.24
June	1.35	3.30	6.83	8.70	8.73	9.29	8.46	4.99	2.11	0.75
July	1.00	1.81	3.96	5.53	5.01	7.27	6.39	5.97	1.99	0.90
August	0.61	1.41	2.93	4.05	4.41	5.15	6.17	3.12	1.47	0.80
September	1.61	2.94	5.21	7.58	7.03	9.19	8.82	4.47	2.72	2.04
October	7.45	9.50	11.96	13.71	14.27	14.10	12.09	5.88	4.74	4.95
November	10.09	10.20	12.85	13.12	15.03	15.41	11.97	7.50	7.54	8.85
December	5.53	4.38	4.90	5.65	6.53	7.17	7.85	5.08	5.57	6.40
	50.15	55.49	78.33	94.15	103.03	112.58	95.60	57.53	43.08	41.50

FLOOD AND DRY WEATHER DISCHARGE CONDITIONS EXPECTED IN THE AREAS UNDER CONSIDERATION

Unit	*Site*	*Catchment Area (Sq. Mls.)*	*Flood Discharge (Cusecs)*	*Dry Weather Discharge (Cusecs)*
A	Kelani Ganga to Kalu Ganga	200	50,000	500
C-1	Dedduwa Area	28	4,000	65
C-2	Madu ganga	23	4,000	60
C-3	Madampeganga	35	5,000	100
C-4	Hikkaduwaganga	20	3,000	50
B-1	Muturajawela	45	7,000	100
G-1	Maha Oya to Deduru Oya	380	75,000	600

Note.—The figures relating to Dry Weather flow are subject to wide variation consequent to tide and wave action, currents, &c. which will also change considerably with the proposed works.

Drainage

14. Next to the satisfactory solution for the exclusion or discharge of flood waters comes the internal drainage scheme. This along with effective outfall works would enable the drainage of the area by gravity to about + 1.0 to + 2.0 M.S.L. within a reasonable period of about 3 days depending on the conditions of tide and wave action at the exit on the one hand and the general rainfall conditions on the other.

15. From investigations and studies recently carried out both in the field and on models it is evident that the level of the ground water table in the low lying lands is influenced by the tide and wave heights reached along the breaches and sand banks that separate the land from the sea.

16. The average tide variations are from + 2.0 M.S.L. at high tide to 1.5 to M.S.L. at low tide. The wave heights vary from 4 ft. to 5 ft. depending on the season. The wave wash up along the sea side slope of the beach does from time to time reach as far and as high as the crest or ridge of the beach itself. This in certain places, is as much as 5 to 10ft. above M.S.L. The effect of this on the low lying land can only be damped by the width of the high ground in between, and secondly by the nature of the sub soil.

17. This is probably one main reason for the failure of the Muthurajawela Scheme despite all the work done from the time of the construction of the Hamilton Canal, during the British period, down to the flood exclusion bunds, drainage channels and regulators during the post independent era. It does not seem possible to drain down the water table to the conventional Zero M.S.L. by merely clearing up the existing water ways or opening new ones, and keeping the outlets free of sand formation. The prime cause leading to this situation might be coast erosion.

18. As at Muturajawela, one cannot therefore estimate with certainity the exact levels to which the water will drain down in each case. Only a rough estimate of the area that will be benefited is therefore possible.

Adopting groynes for the outfall also helps to arrest erosion, if located after careful judgement of adjoining beaches and foreshore.

Pumping

19. Pumping is a definite method by which the water level could be reduced and the land reclaimed. One such pumping unit is already in operation at Attidiya near Colombo on a tract of field 900 acres in extent. Determination of the exact capacity of the pumps required could be best determined by the prior installation of trial pumping units. Purely theoretical estimation may not be quite satisfactory as the extent of ground water will vary with the soil types encountered and hydrological conditions in the area. Sufficient data on this is not available.

There are also factors that limit the extent to which pumping can be carried out. With the lowering of the water table, firstly the rate of infiltration of salt water across the land on the sea side can increase with detriment to cultivation, and secondly the soil can collapse depending on its composition. Under the circumstances, the trial pumping stage should be watched and studied.

Salinity

20. Salinity control structures have been constructed during the past 30 years and even up to the stage of the construction of the salt water exclusion barrage across Madampe Ganga mouth in 1963. These structures are intended to stop the entry of salt water either by a system of manually operated control gates, or flap gates designed to operate automatically.

But judging both from their operation in actual practice and allowing for the possibilities of infiltration of salt water under-ground, it would seem better to locate such structures across the inland canals and tributaries instead of at the end of the main outlet. Furthermore this would provide a larger extent of inland water-way and lake to be linked with fisheries harbour at the outfall work itself and increase the prawn catch.

These upstream sites would also facilitate the location of independent pumping units only where necessary instead of having a single large unit to cover an entire area, including the streams draining down comparatively elevated land.

Soil Investigation

21. Investigation of the soil in these marshy lands is a matter that must be given the necessary attention by the Depastment of Agriculture and suitable action taken to ensure that drainage and salt water exclusion to the extents that are achieved in actual practice, will be sufficient to ensure a successful cultivation, perhaps of special varieties of paddy which are more salt resisting.

At Muturajawela, Soil investigations of a preliminary nature were done by 'Sogreah' of France. The purpose of this investigation was to get some idea of the suitability of the land for cultivation. The soil samples were analysed to obtain the following data :—

(*a*) Equivalent moisture content.
(*b*) Grain size.
(*c*) Organic matter content.
(*d*) Total Nitrogen content.
(*e*) Truog Phospherous.
(*f*) Total Phospherous.
(*g*) Available Pottassium.
(*h*) Lime content.
(*i*) PH value.
(*j*) Conductivity.
(*k*) Exchange complex (Exchangeable Sodium).
(*l*) Sulphur content.

To some extent the results for Muturajawela are indication of soil conditions elsewhere.

As far as could be gathered the results of the experiments conducted by the Department of Agriculture in the test plots cultivated at Muturajawela confirm the suitability of such soils for paddy cultivation.

Work already done

22. Most of the work done in the past has been confined to particular tracts of paddy land situated in the periphery of the much larger extents of totally abandoned land. These works have been initiated through the District Agriculture Committees of the Wet Zone coastal districts and constructed by the Irrigation Department and the small works by the Government Agents in the past, and by the Department of Agrarian Services at present. The works consist of marginal bunds along the lower end of tract with regulator gates across the drainage channels to control flow.

These works when completed were expected to be maintained by the cultivators. Judging by the present condition of most of these works, this does not appear to have been satisfactorily done.

In this connection one has to face the fact that both the poor condition of the ground on which these narrow marginal bunds have to be located, and the quality of the earth available for their construction and exposure to submersion during floods result in their quick failure. It is proposed to use suction dredgers to construct broader marginal bunds in future wherever possible.

More recently the development of the marsh lands has been undertaken on a more ambitious scale by undertaking the construction of sea outfall works as done at Madampe Ganga and Madu Ganga.

With the construction of these works two things have definitely been achieved :

Firstly the flood waters which normally stagnate over the fields for 7 days now run off in about two days.

Secondly there is no sand bar formation, and consequently no heading up of the post flood, and dry weather flow at the outlet, which now maintains an average level of about 0 M.S.L. as against a level of + 4.0 + 5.0 M.S.L. earlier.

23. The next major item of work in progress is the opening up of the larger water ways. This includes the Dutch canal in the Colombo area where the poor condition of the canal had reached a stage when it seriously affected the drainage of the built up parts for the City of Colombo itself.

Most of these drainage canals pass through extremely slushy areas. In the larger canals work is possible only by dredgers. To maintain the excavated canals in proper condition, and to arrest the collapse of the banks, it is necessary to line the banks with timber or concrete rivetments. This is being done.

The proposed overall plan

24. The plan envisages the drainage and reclamation of an extent of about 50,000 acres in the West and South West Sector. It is proposed to achieve about 20,000 acres of this under the first five year programme, and the remaining 30,000 acres thereafter.

Under this plan the low lying area on West and South West from Deduru Oya down to Nilwala Ganga has been divided into 7 independent units A, B, C, D, E, F, G. Each of these units will have their respective sub-units of drainage. These sub-units may be linked to the next by the internal canal system and control gates in certain instances.

The main items of work involved in the execution of this plan will be—

A. *Construction.*— (i) Out fall works
(ii) Reconditioning main water ways,
(iii) Installation of high capacity pumps.
(iv) Salt water exclusion structures and regulators.

B. *Maintenance.*—During construction and thereafter. The construction of outfall works, and salt water exclusion structures and regulators take time. Of these the first is most important and is one that should get priority over other items. The regulators under the second is a must wherever pumping is also involved. To overcome the delay involved in the construction of such structures, temporary structures may be built, pending the completion of the permanent one. In such cases portable pumping units too will be required temporarily. This has the advantage of giving an opportunity to determine with a greater degree of certainty the capacity of the permanent pumping unit to be ultimately installed at a particular site. The reconditioning of the main waterways should commence when the outfall works have reached the stage when sand bar formation has come under fair control. Grab and suction dredgers will be required for excavation and desilting. Unstable sections of the canal banks will be protected by timber rivetments in the agricultural areas, and with concrete rivetments in the city and town areas as being done at present. Marginal bund when necessary will have to be constructed much wider than done in the past, this needs suction dredging equipment.

Statement on Schemes under the first five year Programme

(1) Unit A-1. Drainage in and around Colombo

INTRODUCTION

The City of Colombo is situated around the delta of Kelani Ganga and as such there are a lot of low lying marshy lands to the South of Kelani Ganga, i.e., in the city of Colombo, Kotte, Kolonnawa and to the North of Kelani Ganga i.e., in Wattala, Kelaniya and Ragama.

These marshes are permanently water logged and in certain instances grass has been grown. Generally the soil is a layer of peaty decomposed organic material on a thick blanket of sand and sandy loam.

PRESENT SITUATION

At present the entire area covering an extent over 1,750 acres is more or less permanently water logged. Apart from small extents grown with grass the entire marsh is non-productive and is a veritable breeding place for mosquitoes.

PROPOSALS

The scheme contemplated at present is to construct new drainage canals and recondition existing ones to provide for better drainage facilities for the area. This will promote the utilization of these lands for the growing of food crops mainly vegetables and paddy.

Estimated cost	Rs. 1,345,400
Extent benefited	1,750 acres
Benefit cost ratio	1·36

(2) Unit A-2.—Bolgoda Scheme

INTRODUCTION

Bolgoda Basin extends from Weras Ganga in the North up to Kalu Ganga in the South. Weras Ganga, Bolgoda Lake North, Bolgoda Ganga and Bolgoda Lake South are the main water areas in the Basin. The Bolgoda North and South Lakes which comprise the major water area is 3,775 acres in extent. On the periphery of the water areas the paddy fields are situated.

PRESENT SITUATION

At present the entire basin is drained through Panadura sea outlet. This outlet is often blocked by a sand bar and causes drainage difficulties in the entire basin. The lands on the periphery of the Bolgoda Lakes are low lying between +4 M.S.L. to + 1 M.S.L. and due to poor drainage facilities these lands are almost permanently water logged.

During dry months the outlet gets entirely blocked by a sand bar and this causes inundation of the low lying lands up to about+4 M.S.L. Sometimes heavy rains are experienced in the catchment during this time and this causes flood inundation up to about+6 M.S.L. on the upper reaches. At such instances which are not at all same, it is necessary to cut the sand bar annually to let out the flood water. Total area thus affected between+1.0 M.S.L. and+4 M.S.L. is 5,750 acres.

PROPOSALS

After the completion of this scheme the sea outlet will be kept open throughout the year and will help to lower and maintain the stagnant water level to about +1.0 M.S.L. Hence the lands above+1.0 M.S.L. will be rendered suitable for cultivation at least for one season of the year. In lands closer to the+4 level it may be possible to cultivate even for 2 seasons. During times of flood the necessity for breaching of the sand bar would not arise and the floods will be able to get out easily and in a much more shorter time than at present. It is anticipated that the peak flood level will be less than+4 M.S.L. Thus it can be reasonably concluded that the scheme could benefit 5,750 acres of permanently water logged land to be properly drained and also to considerably reduce the flood peak in level as well as in time.

PHASING OF CONSTRUCTION

(i) Construction of groynes at Panadura,

(ii) Reconditioning of Alut Ela,

(iii) Reconditioning of Dutch Canal.

Estimated cost	Rs. 4,000,000
Extent benefited	5,750 acres
Benefit cost ratio	1·1
Additional benefit	Fisheries Harbour at Panadura

(3) Unit B–1. Dummala Modera Sea

Note.—Dummala Modera Ela drains Maha Welyaya, a tract of 400 acres of paddy land. This is a minor scheme requiring desilting of ela and improvements at outfall at Maggona.

(4) Unit C–1. Dedduwa and Adjoining Scheme

INTRODUCTION

The schemes under consideration are Dedduwa ; Dedduwa-Kantotuwila ; and Ambalanduwa-Kandagoda Schemes. These are three old schemes now proposed to be reconditioned and improved.

PRESENT SITUATION

The salt water exclusion bunds need repairs. The sea outfalls also require improvements.

PROPOSALS

It is proposed to drain further by pumping.

Estimated cost	Rs. 1,500,000
Extent benefited	1,950 acres
Benefit cost ratio	1·23

(5) Unit C–2. Madu Ganga-Karijjapitiya Scheme

INTRODUCTION

The Madu Ganga Lake is situated 48 miles South of Colombo and the sea outlet at the 50th mile-post on Colombo-Galle Road. Catchment 22.5 sq. miles. The area called Karijjapitiya also is included in the Scheme. Additional outlet at Karijjapitiya.

Work includes construction of groynes, retaining walls on L.B. and R.B. of outfall, clearing of drainage course of Madu Ganga and the internal drainage lines and construction of S.W.E. dikes and structures.

PROPOSALS

The outfall structure is 90% complete and is functioning quite satisfactorily. Work in the internal drainage channels has commenced. It is proposed to drain the Karijjapitiya, Madu Ganga and Ramboda Lakes further by pumping.

Estimated cost	Rs. 2,500,000
Extent benefited	2,500 acres (of which 500 acres already benefited)
Benefit cost ratio	1·1
Additional benefits	Fisheries Harbour at Balapitiya and beach reclamation

(6) Unit C–3. Madampe and Telwatte N.

INTRODUCTION

This is a section where outfall works and S.W.E. structure has recently been completed. The groynes need a little repairs and rock under the P.W.D. and Railway Bridges remains to be excavated to obtain the full benefits of the work so far proposed.

PRESENT SITUATION

Repair work to groynes and clearing of internal drainage channels in progress.

PROPOSALS

It is proposed to extend the scheme to cover a portion of low land on the South in the Telwatta area. This will involve pumping and be of additional benefit to the area already proposed to be benefited.

Estimated cost	Rs. 675,000 for work done so far
Extent benefited	1,300 acres so far and probably 4,000 acres ultimately
Additional benefits	Fisheries Harbour at Ambalangoda

(7) Unit C–4. Hikkaduwa and Telwatte Scheme

INTRODUCTION

This is an entirely new scheme. The mouth of the Hikkaduwa Ganga at present gets totally blocked by a big sand bar about 6 ft. high which obstructs dry weather flow and a potential danger during floods. A diversion channel constructed years back is of not much help.

PROPOSALS

To construct outfall works and recondition drainage channels and S. W. E. structures.

Estimated cost	Rs. 3,500,000
Extent benefited	2,750 acres
Benefit cost ratio	1·13
Additional benefits	Fisheries Harbour at Hikkaduwa, Coast protection

(8) Unit D–1. Purana Ela and Kepu Ela

Note.—Two ancient waterways passing through Galle Town and through which the City Drainage has to pass. At present badly silted and blocked, causing drainage difficulties to surrounding low lying areas.

(9) Unit D–2. Moragoda Ela

Note.—A natural waterway, from a tract of paddy land and passing through the outskirts of Galle Town and with exit into Galle Harbour. At present in poor condition and causes drainage problems and flooding of adjoining low land including built up areas in and around Galle.

(10) Unit D–3. Waggalmodera Scheme

Note.—An existing minor drainage channel and outfall requiring reconditioning and improvements. Work in progress.

(11) Unit D–4. Eluwawila Scheme

Note.—A minor work, to provide drainage to fields on the L.B. of Polwatte Ganga. Work involves opening up of a drainage channel.

(12) Unit D–6. Kirala Kelle Scheme

INTRODUCTION

This is a scheme to drain and reclaim the large tract of land on the right bank of Nilwala Ganga. This tract is already protected from the ganga floods, area adjoins Matara Town.

PRESENT SITUATION

The upper reaches are cultivated with difficulty. The lower areas are abandoned marsh lands.

PROPOSALS

To isolate into separate areas, depending on relative elevation and location, and to open up canals, and to pump out the water from these points.

Estimated cost	Rs. 800,000
Extent benefited	4,000 acres
Benefit cost ratio	1·35

(13) Unit E–1. Muthurajawela

Note.—A tract of about 5,000 acres situated North of Colombo badly water logged and continues to be almost totally abandoned. Past attempts to drain have proved a failure. The most recent decision of Government is to explore the possibilities of reclaiming whatever extent possible by filling. A preliminary report on this is being prepared by the Irrigation Department.

(14) Unit G–1. Iranavillu Scheme

INTRODUCTION

Providing flood relief and drainage facilities to the tract of fields and abandoned land a little south of Chilaw.

PRESENT SITUATION

The Water has its exit into Chilaw Lagoon. But due to the influence of Deduru Oya, there is heading up of the water. The sand bar at Thoduwawa has to be cut open to ease the situation.

PROPOSAL

To provide outfall works at Thoduwawa and to recondition waterway.

Estimted cost	Rs. 2,000,000
Extent benefited	1,800 acres
Benefit cost ratio	1·1
Additional benefits	Fisheries Harbour at Tranawillur

Construction Programme

To provide the 20,000 acres at the end of 5 years, and at an average rate of 4,000 acres per year, it is necessary that the work in constructing the outfall structures at three sites—Panadura, Hikkaduwa and Iranavillu be commenced right at the start. These works take time, and need to be watched at different stages of construction.

Where necessary the dredging and reconditioning should be concentrated on the vital sections to begin with, to ensure quick results possible from this item of work where flooding caused by internal obstructions are involved.

Thereafter, the dredging should be carried out continuously to convey from the outfall works, up along the waterways the full benefits of the outfall.

The installation of the temporary pumping units will be followed by the permanent pumping stations and salt water exclusion structures.

25. Requirement of Construction Equipment

(1) *Dredging Equipment*

(i) Suction Dredgers 10″	2 Nos.
(ii) Suction Dredgers 8″	3 Nos.
(iii) Delivery Hose for above 10″ and 8″	
(iv) Grab Dredgers 3/8 cu. yds.	2 Nos.
(v) Grab Dredgers ½ cu. yds.	2 Nos.
(vi) Barges self propelled	6 Nos.
(vii) Pontoon mounted pile driver (small)	2 Nos.

(2) *Rock Drilling Equipment*

(i) Air Compressor 500 c.f.m.	3 Nos.
(ii) Rock Drills, Drill Hammers	For 3 quarry sites
(iii) Drill Stems and Bits	

(3) *Rock Loading, Transporting and Placing Equipment*

(i) Excavator with rock grab 4 ton	3 Nos.
(ii) Floating Crane 4 ton capacity	1 No.
(iii) Crawler Crane 4 ton capacity	3 Nos.
(iv) Euclid Rear Dumpers	15 Nos.
(v) Tractor Class I	3 Nos.

(4) *Other Equipment*

(i) Boats with Driving Motor	6 Nos.
(ii) Field Servicing Units	4 Nos.
(iii) Miscellaneous Equipment	

(5) *Spares for above*

PUMPING EQUIPMENT FOR STAGE I

Aerial flow—12 ft. lift

Pumps	50	Cusecs	(Diesel)	4 Nos.
,,	25	,,	,,	4 Nos.
,,	10	,,	,,	5 Nos. (Portable Units)
,,	50	,,	(Electrical)	2 Nos.
,,	25	,,	,,	2 Nos.

Overall Cost of the Project

26. It is estimated that the average rate per acre of land that will be benefited will be Rs. 800. This includes the cost of all items of construction work involved in the outfall works, providing the major waterways, capital cost of pumps, and operation cost of pumps during the trial period.

It also allows for the charging of the cost of all the special construction equipment like dredgers, pontoon, etc., that will have to be specially ordered for this type of work.

Payment for machinery like Tractors, Compressors, etc. which are common to other construction works of the Department can be paid for on the normal hire charge basis.

The total cost of construction equipment and pumps is estimated at about Rs. 9,000,000. The construction period, for the entire project of 50,000 acres is estimated at 12½ years which can be taken to be a reasonable efficient life time for the equipment. This consideration too would favour the purchase of all the necessary construction equipment right at the start of the first Five-Year Programme.

Maintenance during and after construction

27. It is proposed that the Irrigation Department maintains all the structures, pumps, major waterways, and the isolation and marginal bunds, both during the stage of construction and thereafter.

The Department of Agrarian Services should take necessary action to ensure that minor waterways and field drainage channels shall be maintained by the Cultivation Committee of the area.

The maintenance of the major waterways by the Department will be mainly by mechanically dredging equipment. A bed width of 10ft. may arbitrarily be fixed in demarcating the canals to be maintained by the Department.

Recovery of costs from beneficiaries

28. Recovery of costs in some form must be made to justify expenditure by Government. But, past experience is that recovery of even the cost of maintenance has presented problems.

The operational cost of Pumps will be a major factor in the determination of maintenance costs. Most of the pumps will be diesel driven. But, in connection with the pumps that will be electrically driven, it will be necessary to introduce a special tariff, instead of the industrial or even the domestic tariff which are far too high.

Under the circumstances, it is proposed to delay a final proposal on the subject of recovery of rate, until the actual maintenance costs are determined in the field.

But, action must be taken to see that even as the benefits first begin to appear in the upper reaches, the preliminary field work will begin. This must start with the removal of salvinia by hand as done by some of the more keen cultivators at Attidiya and elsewhere, as the land may be sufficiently drained to start a cultivation though not to kill the salvinia. This seems to be the first practical step to be taken in the solution of the salvinia problem, and also in the better maintenance of the waterways. If only this is done, can the full benefits of the work be judged even as the work progresses to justify the continuation of the work as planned.

Propaganda

29. As a step to obtain the early co-operation of the cultivators in this direction, it is suggested that the Department of Agriculture and Agrarian Services, jointly work as many demonstration tracts as possible for a season or two, and help in tackling any special problems to make the scheme a success.

Conclusion

30. The scheme for the reclamation and drainage of the land under consideration is recommended.

The works proposed are expected not only to step up considerably the yearly rate of paddy production, but also to provide the following additional benefits to make them multi-purpose projects well worth the cost of execution :—

(i) Better drainage and flood protection facilities in built up areas including Colombo and Galle and Urban areas.

(ii) Provide facilities for the anchorage of boats. Fisheries harbours protected from the Monsoon.

(iii) Provide lakes and waterways for the development of inland fisheries.

(iv) Provide inland navigation facilities.

(v) Arrest coast erosion and also help to build up the beaches adjoining the outfall works.

(vi) Provide a source of income to the many unemployed residents in the area, and to some who actually own small extents of these lands abandoned at present.

(vii) Arrest the situation of more and more land gradually going out of production.

STATEMENT 'A'

ITEMISED WORKS 1965/66—PROGRAMME OF ACREAGE AND NOTES

65/66 S. H.	*Name of Scheme*	*Total Crown Area benefited*	*Extent benefited to end of 1965*	*Extent to be benefited*					*NOTES*
				65/66 Acres	*66/67 Acres*	*67/68 Acres*	*68/69 Acres*	*69/70 Acres*	
9	Improvements and repairs to Village Irrigation Works and Reclamation and Drainage Works	2,500		500	500	500	500	500	Reconditioning of Minor Dr. Chls. Listed in Statement in Coastal Areas
18	Reconditioning of Drainage lines in Colombo	1,000		500	500				Reconditioning of Major Dr. Chls. in Colombo Kotte, Kolonnawa and Wattala
22	Muthurajawela Scheme								Further investigations necessary. Effect on ground water level due to coastal erosion being examined by dept.
31	Improvements and regrading Kittampahuwa	350	250	100					Work nearing completion
32	Reclamation of Swamps in and around Colombo								F. I. being done by dept. to reclaim 1,500 Acs. land vide S.P. VIII–1960. Feasibility—January 1966, Final plans specification to be decided thereafter
53	Madampe Lake Dr. & S.W.E. Scheme	4,000	2,000	1,000	1,000				Provides for (i) Groynes to prevent sand bar formation (ii) S.W.E structure. Better Dr. facilities & fisheries harbour. Balance work impts. to Groynes.
56	Improvements to Waggalmodera Dr. Scheme	435	235	200					Clearing of Dr. Chls.
65	Madu Ganga Dr. and S.W.E. Scheme	2,500	500	200	500	500	500	300	Construction of Groynes to prevent sand bar formation completed. Results watched. Plans awaited from S.G. to take up S.W.E. works and Int. Dr. Chls.
73	Elephant Pass Lagoon Scheme								S.W.E from Elephant Pass Lagoon and diversion of fresh water into Jaffna Lagoon.
	Total	10,785	2,985	2,500	2,500	1,000	1,000	800	

STATEMENT B

ITEMISED WORKS 1965/66—ESTIMATES PROGRAMME OF EXPENDITURE

65/66 S.H.	Name of Scheme	Total Crown Area benefited	Cost			Expenditure to end of 64/65	Extent benifited to end of 1965	Cost										Remarks
			Total	Local	Foreign			65/66		66/67		67/68		68/69		69/70		
								Loc.	For.	Loc.	For.	Loc.	For.	Loc.	For.	Loc.	For.	
9	Improvements and repairs to Village Irrigation Works and Reclamation and Drainage Works	2,500	771,500	200	300	Block Vote		200	130	300	200	300	300	300	200	300	200	
18	Reconditioning of Drainage Lines in Colombo	1,000	1,000,000	500	500	New Item		200	300	200	300							
22	Muthurajawela Scheme		1,750,000			1,287,000												
31	Improvements and regrading Kittampahuwa drainage channel	350	230,000			225,000	250											
32	Reclamation of Swamps in and around Colombo		1,500,000															
53	Madampe Lake Dr. & S.W.E Colombo	4,000	675,000			640,000	2,000	20		15								
56	Improvements to Waggala-Modera Dr. Scheme	435	200,000			110,000	235	40	50									
65	Madu Ganga Dr. & S.W.E. Scheme	2,500	2,500,000	515	700	1,375,000	500	50	50	200	200	200	200	165	150			
73	Elephant Pass Lagoon Scheme		1,620,000			1,580,000		40										
	Total	10,785	10,246,500	1,215	1,500	5,217,000	2,985	550	530	715	700	500	500	465	350	300	200	

STATEMENT C

S. H. 9—DETAILS OF DR. AND REC. WORKS

Continuation Works

(In Rs. 1,000)

No.	Name of Scheme	Irrigable Area			Total Expenditure		Remarks
		Existing Acres	New Acres	Total	Estimate Rs.	Up to 1965	
	Colombo District	*					
1.	Mahara Mudun Ela				35	8·6	
2.	Heen Ela				73	47·6	
3.	Modera Main Channel				40	13·9	
4.	Wellawatta Channel				31	6·1	
5.	Mahawatta Ela				70	56·8	
6.	Bolgoda Ela				50	47·5	
7.	Dehiwala Ela				70	34·3	
8.	Attidiya Drainage Scheme				62	39·7	
9.	Kittampahuwa Scheme				15·7	10·3	
10.	Dehiwala North Channel				70	23·2	
11.	Dehiwala Canal North				70	55·0	
12.	Santha Bastiyama Ela (North)				22	6·8	
13.	Santha Bastiyama Ela (South)				56	23·1	
14.	Dummalamodera S.W.E. Scheme	184	—	184	75		
	Galle District						
1.	Beraniya Ela Stage I				75	41·2	
2.	Beraniya Ela Stage II				28	14·5	
3.	Desilting of Porok Ela				3·7	1	
4.	Clearing of Palu Ganga Ela				1·1	0·1	
5.	Do. Madampe Lake				2·6		
6.	Do. Muketiya Ela				1·3	0·2	
7.	Do. Dikwela Ela				1·9	0·2	
8.	Do. Shuduwegoda Ela				1		
	Kalutara District						
1.	Mahawelyaya Scheme	384		384	75	29.5	
	Jaffna District						
1.	S.W.E. Scheme Delft	100		100	33	29·1	
2.	Do. Iranaturu	200		200	33	8·1	
3.	Do. Anaikedanku		1,000	1,000	50		
4.	Do. Arali East	200		200	75		
	Vavuniya District						
1.	Ambalavan Pokkanai S.W.E. Sch.	200		200	20		
	Mannar District						
1.	Vankalai		85	85	50	44	

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* Improved Drainage in Colombo Area.

STATEMENT D

FINALISED SCHEMES READY FOR CONSTRUCTION—TENTATIVE PROGRAMME OF ACREAGE

No.	*Name of Scheme*	*Total Area benefited*	*B-C Ratio*	*Extent benefited to end of 1965*	*Extent* 65/66	66/67	67/68	68/69	69/70	*Notes*
1	Hikkaduwa Ganga	2,750				500	1,000	1,000	250	Groynes for prevention of sand bar formation, to ease floods and discharge of river. Fisheries Harbour.
2	Panadura Ganga	3,000				1,000	1,000	1,000		Groynes to prevent sand bar formation to ease floods and drainage of river. Fisheries Harbour
3	Iranavillu	1,000				600	600	600		In Nattandiya Electorate. Groynes to prevent sand bar formation, to ease Gin Oya floods, and drainage. Fisheries Harbour.
4	Tangaluwelyaya	1,350								Groynes to prevent sand bar formation, to ease Kirama Oya floods & drainage. S.W.E. Bunds and regulators. Fisheries Harbour.
5	Kiralakela	2,000+50% of 2,000			500	500	2,000			At Matara. Reconditioning Drainage & channels, isolation bunds. 3 Nos. Pumping Stations.
1	Purana Ela and Kepu Ela	200				100	100			Reconditioning Drainage Chls. in Galle Town.
2	Moragoda Ela	500				100	200	200	200	Reconditioning Drainage Chls. in Galle Town.
Miscellaneous										
1	Concrete Rivetments									
2	Reclamation in and around Colombo	1,500+3,000								1,500 Acs. for Housing. 3,000 Acs. Agricultural in Madiwela Area.

Statement E

FINALISED SCHEMES READY FOR CONSTRUCTION—TENTATATIVE PROGRAMME OF EXPENDITURE

(In Rs. 1,000)

No.	*Name of Scheme*	*Total Area benefited*	*B-C Ratio*	*Cost*			*Exp. end 64/65*	*Extent of benefited to end of 1965*	*Cost*										*Remarks*
				Total	*Loc*	*For*			*65/66 Loc.*	*65/66 For.*	*66/67 Loc.*	*66/67 For.*	*67/68 Loc.*	*67/68 For.*	*68/69 Loc.*	*68/69 For.*	*69/70 Loc.*	*69/70 For.*	
1	Hikkaduwa Ganga	2,750	1·1	3,500	1,350	2,150	*Nil*	*Nil*	100	150	250	500	250	500	250	500	500	500	
2	Panadura Ganga	3,000		3,000	1,500	1,500	„	„	200	300	250	500	250	500	250	250	250	250	
3	Iranavila	1,000	2·0	2,000	1,000	1,000	„	„	200	300	200	300	200	300	200	300	—	—	
4	Tangaluwelyaya	1,350	1·25	1,000	500	500	„	„	100	200	100	200	100	200	50	50	—	—	
5	Kiralakele	2,000+50% of 2,000	1·35	800	400	400	„	„	100	100	200	200	100	100	—	—	—	—	
	Major Drainage Channels																		
1	Purana Ela and Kopu Ela Galle	200		230	100	130			—	—	50	50	50	50	15	15	—	—	
2	Moragoda Ela—Galle	500		750	300	450			—	—	—	—	100	150	100	150	100	150	
3	Dutch Canal—Puttalam to Chilaw	2,000		2,500	1,000	1,500			—	—	200	500	300	500	300	300	200	200	
4	Dutch Canal—Chilaw to Ja-Ela	2,000		2,000	500	1,500			—	—	100	500	150	500	150	300	100	200	
5	Dutch Canal—Ja-Ela to Weras Ganga	—		—	—	—			—	—	—	—	—	—	—	—	—	—	Taken up under S.H. 18
6	Dutch Canal—Weras Ganga to Kalu Ganga	1,000		750	250	500			—	—	75	300	100	100	75	100	—	—	
7	Mahavamudun Ela	750		80	40	40			—	—	—	—	25	25	15	15	—	—	
8	Alut Ela in Bolgoda	1,750		250	100	150			—	—	—	—	25	75	50	50	25	25	
9	Eluwawila Drainage Channel	300		100	60	40			—	—	—	—	—	—	25	25	25	25	
	Miscellaneous																		
1	Concrete Rivetments	—		—	—	—			45	30	70	40	100	50	100	60	120	80	
2	Reclamation in and around Colombo	1,500+3,000		—	—	—			—	—	—	—	—	—	—	—	—	—	Special Item
									745	1,080	1,495	3,090	1,750	3,050	1,580	2,115	1,320	1,430	

STATEMENT F

SUMMARY OF ACREAGES AND EXPENDITURE PROGRAMME

(Expenditure figures in Rs. 1,000)

	1966		*1967*		*1968*		*1969*		*1970*	
Acreage										
Itemised Works	2,500		2,500		1,000		1,000		800	
Schemes ready for construction	500		2,700		4,800		2,800		450	
	3,000		5,200		5,800		3,800		1,250	
	Local	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*
Expenditure										
Itemised works	550	530	715	700	500	500	465	350	300	200
Schemes ready for construction	745	1,080	1,495	3,090	1,750	3,050	1,580	2,115	1,320	1,430
	1,295	1,610	2,210	3,790	2,250	3,550	2,045	2,465	1,620	1,630

STATEMENT G

DETAILS OF DR. AND REC. SCHEMES

New Works

Name of Scheme	*Irrigable Area*			*Total Expenditure*	*Remarks*
	Existing	*New*	*Total*	*Estimate up to 65* *Rs. c.*	
COLOMBO DISTRICT					
GALLE DISTRICT					
Dedduwa S. W. E. Scheme	1,050	1,045	2,095		
(1) Obedawatte Channel				10,500 00	
(2) Kaikawala Channel				24,500 00	
Hungantota S. W. E. Scheme	60	50	110		
(1) Kahagalla Ela				3,000 00	
Dedduwa Rantotawila S. W. E. Scheme	975	975	1,950		
(1) Andu Ela				7,000 00	
(2) Berawa Ela				2,500 00	
(3) Beratuduwa Ela				4,500 00	
(4) Horawela Ela				6,500 00	
(5) Nahitiya Ela				2,500 00	
(6) Kalugal Ela				18,000 00	
(7) Malawala Ela				6,000 00	
(8) Meegaspitiya Ela				7,500 00	
(9) Puwakgaha Ela				6,000 00	
(10) Ambalanduwa Ela				4,500 00	
(11) Galagawa Ela				5,000 00	
Ambalanduwa Kandegoda S. W. E. Scheme	121	100	221		
(1) Gan Ine Ela				12,000 00	
(2) Naidu Ela				10,000 00	
(3) Wetakeiya Atta Ela				3,500 00	
(4) Goda Ella Ela				4,500 00	
(5) Gingaha Ela				22,000 00	
Elpitiya Ela Basin	1,000	1,000	2,000		
(1) Uragaha Ela				5,000 00	
(2) Elpitiya Ela and Branches				35,000 00	

STATEMENT H

STATEMENT OF AREAS AND EXTENTS TO BE DRAINED AND RECLAIMED IN THE WESTERN AND SOUTH-WESTERN COASTAL BELT

Unit	Location between	Sub-Unit	Drainage Scheme	*STAGE I*		*STAGE II*	
				Under 1st5–Year Plan		*After 1970*	
				1966–1970 Benefits to Fields		*1971–1979 Benefits to Fields*	
				Approx. Existing Acs.	*Approx. New Acs.*	*Approx. Existing Acs.*	*Approx. New Acs.*
A	Kelani Ganga/Kalu Ganga	A–1	In an around Colombo	—	1,750	—	—
		A–2	Bolgoda	—	3,000	—	2,750
		A–3	Madiwala	—	—	1,000	2,000
		A–4	Around Colombo for Housing (other areas)	—	—	500	1,500
B	Kalu Ganga/Bentota Ganga	B–1	Dummala Modera Scheme (other areas)	400	—	2,000	2,000
C	Bentota Ganga/Gin Ganga	C–1	Dedduwa & adjoining Scheme	975	940	—	30
		C–2	Maduganga/Karijjapitiya	400	1,600	—	—
		C–3	Madampe/Telwatta N.	1,000	1,500	—	—
		C–4	Hikkaduwa/Telwatta S.	1,250	500	—	1,000
			(other schemes)	—	—	500	500

D	Gin Ganga/Nilwala Ganga	D-1	Purana Ela/Kepu Ela	—	200	—	—
		D-2	Moragoda Ela	200	300	—	—
		D-3	Waggalamodera	435	—	—	—
		D-4	Eluwawila	150	150	—	—
		D-5	Koggala	—	—	300	1,700
		D-6	Kirala Kelley	2,000	1,000	—	1,000
			(other schemes)	—	—	500	500
E	Kalani Ganga/Attanagalu Oya	E-1	Muturajawela	—	500	—	2,500
			(other schemes)	—	—	2,000	1,000
F	Attanagalu Oya/Maha Oya	F	(other schemes)	—	—	1,000	—
G	Maha Oya/Deduru Oya	G-1	Iranavilu	—	800	1,000	—
			Dutch Canal	—	—	2,000	170
			(Wellamankarai & other schemes)	—	—	2,000	1,500
				6,810	12,240	12,800	18,150
					6,810		12,800
					19,050		30,950
							19,050
						Grand Total	50,000

CHAPTER V

INVESTIGATION AND DESIGNS OF NEW PROJECTS

1. The programme of investigations and designs of multipurpose and major works for the five year plan period which can be taken up for construction towards the tail end of the plan period or in the next plan period are as follows:—

Basin	*Project*	*Irrigable Extent Acs.*	*Approximate Cost Rs.*
1. Heda Oya	Heda Oya Reservoir	30,450	95,000,000
2. Karanda Oya	Karanda Oya Reservoir	12,450	39,000,000
3. Mi Oya	Inginimitiya Reservoir	40,000	130,000,000
4. Deduru Oya	Ridi Bendi Ela		
5. Yan Oya	Horowapatana Reservoir	33,800	105,000,000
6. Kirindi Oya	Tanamalwila Reservoir	23,000	82,000,000
7. Mundeni Aru	Maha Oya	14,500	70,000,000
	Gallodai Aru Reservoir	13,000	13,000,000
8. Parangi Aru	Upper Parangi Aru Reservoir	8,200	23,500,000
9. Pali Aru	Pali Aru Reservoir	2,100	6,500,000
10. Samanalawewa		20,000	—
11. Mahaweli Basin	Not finalised	500,000	Not finalised
12. Kelani ganga	—	—	—
13. Kalu ganga	—	—	—
14. Gin ganga	—	—	—
15. Nilwala ganga	—	—	—

2. A short description of these projects are given below :—

Appendix A gives the present position and investigations on items 1–9 above.

(1) *Heda Oya Reservoir.*—Construction of a Reservoir across Heda Oya to intercept a catchment of 161 sq. miles and to provide channels for the irrigation of 30,450 acres of new lands. This scheme will benefit 15,225 landless peasant families at a cost of about 95·1 million rupees of which 57·1 million Foreign and 38 million rupees local costs.

(2) *Karanda Oya Reservoir.*—Construction of a Reservoir across Karanda Oya. This would intercept a catchment of 60 sq. miles and provide sufficient storage of water to irrigate 12,450 acres of new lands. The total cost of this

project inclusive of irrigation facilities is 39 million rupees of which 23·4 million rupees is the foreign amount and 15·6 million rupees is the local portion. This scheme will provide benefits for 6,225 landless peasant families.

(3) *Mi Oya Reservoir* (*Inginimitiya*).—The Reservoir with a catchment of 203 sq. miles has an irrigation potential for only 9,000 acres development under paddy. There is a surplus of land in this basin while Deduru Oya Basin has a surplus of water and a shortage of land. For this reason Deduru Oya Reservoir at Ridi Bendi Ela will be constructed to store and re-regulate the surplus flow of Deduru Oya to Mi Oya Basin. Mi Oya Reservoir for this purpose will have additional storage to accomodate the diverted flows from Deduru Oya to meet the irrigation demands. The cost apportioned for this reservoir is on the basis of independent irrigation potential. All other costs and benefits over and above the 9,000 acres committments are charged on to Deduru Oya Reservoir at Ridi Bendi Ela.

(4) *Ridi Bendi Ela Reservoir.*—Apart from storing water to command lands under it, this reservoir which is across Deduru Oya, will cater to the needs of diversion of the surplus water to Mi Oya Basin. It has a catchment of 537 sq. miles and will be sufficient for the development of 31,000 acres paddy. 20,000 families who are landless in this region can be settled. The cost of this project would be in the region of Rs. 98·5 million comprising of Rs. 59·1 million foreign cost and Rs. 39·4 million local cost.

(5) *Horowapatana Reservoir.*—33,800 acres of new irrigable lands would be commanded by this reservoir. The area draining into it is 97·5 sq. miles. It would cost about 105·6 million rupees (Foreign Rs. 63·3 million and local Rs. 42·3 million) to complete the entire project which would benefit 16,900 landless peasant families.

(6) *Tanamalwila Reservoir.*—It is proposed to construct a reservoir across Kirindi Oya to intercept a drainage area of 268·7 sq. miles with storage capacity sufficient to meet the demands for 23,035 acres of new irrigable lands and 4,565 of existing lands. The cost of the entire scheme on completion will be approximately 82·0 million rupees of which 49·2 million rupees would be foreign costs and 32·8 million rupees local costs. 11,517 landless peasant families would directly benefit by this project.

(7) *Maha Oya Reservoir.*—Construction of a new reservoir across the Maha Oya to intercept a drainage area of 86 sq. miles and to store sufficient water to provide facilities to 14,969 acres of new lands and 8,851 acres of existing rainfed paddy fields. The entire project will be about 69·7 million rupees (41·8 million rupees foreign and 27·9 million rupees local costs) and will benefit 7,485 landless peasant families.

(7A) *Gallodai Reservoir.*—This reservoir is to be constructed across Gallodai Aru intercepting 86·0 sq. miles of drainage area and to accommodate sufficient storage for issue to 13,000 acres of irrigable land. On completion of the entire scheme at a cost of about 42·8 million rupees (25·6 million rupees foreign and 17·2 million rupees local portion) 6,500 landless peasant families could be settled.

(8) *Upper Paranki Aru Reservoir.*—Of the two reservoirs across Paranki Aru, this one is sited across its upper reaches. The yield from its catchment of 190 sq. miles is sufficient to bring under command 8,200 acres of new undeveloped land. This land could be allotted to 4,100 peasant families, who do not possess any land. The whole project is expected to cost Rs. 25.5 millions made up of Rs. 15.3 million foreign part and Rs. 10.0 local portion.

(9) *Pali Aru Reservoir.*—This is located across the lower reaches of Pali Aru with a capacity necessary to command 2,100 acres of new irrigable lands which extends almost upto the sea coast. It's catchment area is 64.0 sq. miles. 1,050 landless peasant families could benefit by this project which would require about Rs. 6.5 millions, comprising of Rs. 3.9 million foreign portion and Rs. 2.6 million local portion.

(10) *Samanala Wewa Project.*—The Walawe Ganga one of the five largest perennial rivers in the Island has its source at an elevation of 6,100 feet above mean sea level in the Adam's Peak range. The river has a total length of 85 miles and drains a basin area of 954 square miles discharging into the sea at Ambalantota, about 1,110,000 acre feet of water in an average year. It has seven major tributaries of which three are on the left bank and four on the right bank. The present development of the basin consists of tea and rubber in the upper basin and about 15,000 acres of paddy fields in the lower basin. The mean annual rainfall over the Walawe Ganga basin ranges from 145 inches at Rasagalla to 44 inches at Ambalantota. The catchment area receives the benefit of both monsoons and the rainfall and surface run-off are evenly distributed over the 12 months.

The development of the Walawe Ganga basin has been receiving the attention of the Government for several years. The following are the major proposals for the development of the basin :—

Name of Reservoir	*Storage capacity in Acre Feet*	*Extent benefited in Acres*	*Power potential in M. W.*
Chandrika Wewa	20,000	5,000	—
Uda Walawe	204,000	50,000	5·4
Samanalawewa and Fore bay	313,200	20,000	120
Mau Aru Reservoir	15,000	—	—
Weli Oya Reservoir	117,000	16,700	4

The construction of Chandrika reservoir was taken up first and has been completed. The reservoir is on the Hulanda Oya, a tributary on the right bank of Walawe Ganga. The 5,000 acres irrigable under this tank have been provided with irrigation facilities. The construction of Uda Walawe reservoir with a capacity of 204,000 acre feet was started in 1964 and is expected to be completed by 1967. Development of lands under the reservoir covering an extent of 60,000 acres will be completed in 6 years time.

The most important reservoir is, however, the Samanala Wewa. The engineering surveys of this Scheme had been taken during the period 1957–1960 and the necessary hydrological and other data obtained by the Irrigation Department. An Agreement was entered into between the International Co-operative Administration of the U. S. A., and the Ceylon Government for the preparation of an Engineering survey report on the economic and engineering feasibility of the Samanala Wewa multi-purpose project. The feasibility report was prepared by the Hydro Technic Corporation of New York and the Engineering Incorporation Inc. of Denver who were entrusted with this work by the I. C. A. The main features of the feasibility report are as follows:—

(*a*) Construction of a dam across the Walawe Ganga at the confluence of the Walawe Ganga and Beli Hul Oya at an elevation of 1,549 feet above M. S. L. and thereby creating a reservoir with a capacity of 345,000 acre feet and covering 3,240 acres during maximum flood, and a normal capacity of 265,000 acre feet covering 2,740 acres. The dam across the river will be 1,665 feet long and 353 feet high. Active storage capacity is 118,600 ac. ft.

(*b*) Samanala Tunnel (pressure type) 8,870 feet in length and 10 ft. 3 inches in diameter to bring the water from Samanala Wewa to the Forebay Reservoir across the Diyawini Oya.

(*c*) Forebay Reservoir dam across the Diyawini Oya. The dam will be 600 feet long, 128 feet high, and the forebay reservoir will cover 190 acres and contain 12,600 acre feet of water. Active Storage Capacity is 6,400 ac. ft.

(*d*) Samanala Wewa Power Plant consisting of four units each developing 30,000 kilowatts. The Plant will be located at Katupath Oya Afterbay Reservoir. The turbines are to be rated at 46,000 horsepower each under a design head of 1,029 feet. The vertical, standard-type fifty-cycle operation generators will have a name plate rating of 33,000 K.V.A. at 0·9 power factor. The turbines would be designed for the full generator load including overload. They would be reaction-type machines. The power plant would be enclosed.

(*e*) Switch Yard and Transmission System.

(*f*) Construction Community and facilities including access roads and camps for staff.

On receipt of the feasibility report tenders were called for the preparation of the detailed engineering plans for the head-works, power plant generators etc., as well as detailed specifications, tender documents, economic appraisal of the project. The successful tenderer was Messrs. Engineering Consultants Inc. of Denver. The draft report of the Engineering Consultants was submitted in June 1965. The main features of the Samanala Wewa project as proposed in the draft report, are as follows :—

(*a*) *Dam and Reservoir.*—Dam across the Walawe Ganga to be constructed at the confluence of the Walawe Ganga and Beli Hul Oya, with a crest elevation of 1,543 feet above M. S. L., Reservoir thus created will have a full supply capacity of 296,000 ac. ft. and covering 2,860 acres at elevation 1,535 M. S. L. The active storage capacity of the reservoir, will be 164,000 ac. ft. The Dam will be 1,650 ft. long and 345 ft. high (maximum).

(*b*) *Samanala Wewa connecting Tunnel (Pressure Type).*—The Tunnel to be 10,000 ft. in length and 15 ft. in diameter to convey water from Samanala Wewa to the Forebay Reservoir on Diyawini Oya. The invert elevation at tunnel inlet to be 1,450 M. S. L.

(*c*) *Dam across the Diyawini Oya and Forebay Reservoir.*—The Dam will be 480 ft. long, and 155 ft. high (Maximum). The reservoir will have a cross capacity of 17,200 ac. ft. of water, with a surface area of 470 acres, at full supply elevation of 1,535 M. S. L. Active Storage capacity will be 15,900 ac. ft.

(*d*) *Power Waterways.*—Water will be conveyed to the Power Plant, from the Forebay Reservoir through a tunnel. The first section of this tunnel will be inclined and the second section horizontal. The total length of the tunnel will be 2,645 ft. and the diameter 20 ft. A length of 480 ft. of the tunnel will be lined and the rest unlined. The Penstock to be of four steel lined, concrete-encased circular pipes, each 5·5 ft. in diameter and 410 ft. long.

(*e*) *Samanala Wewa Power Plant.*—The plant to be located above Katupath Oya Afterbay Reservoir and will consist of five units of 30,000 k.w., each with an initial installation of 2 units, and provision for the addition of 3 units later. The turbines are to be rated at 42,000 Horse Power each, under a design head of 1,031 ft. The vertical shaft Francis Turbine will operate generators, having a rating of 30,000 k.w. at 0·9 power factor, 50 cycle.

(*f*) *Dam across Katupath Oya and Afterbay Reservoir.*—Dam across Katupath Oya will create a reservoir of capacity 59,000 ac. ft. and surface area of 1,645 acres at Full Supply elevation of 482·0 M. S. L. The active storage will be 45,000 ac. ft. The dam will be 2,750 ft. in length and 120 ft. high (maximum). The reservoir will regulate flow from turbines to irrigate 40,000 acres paddy.

(*g*) *Transmission on System.*—Double circuit 132 k.w. Transmission Lines from Samanala Wewa switchyard, to Balangoda Grid sub station, with additional switching bays at Balangoda.

A Technical Committee consisting of officers of the Irrigation, Electrical, Agriculture and Planning Departments as well as the Gal Oya Development Board was appointed to report on the draft report. This Committee suggested certain modifications. The Committee recommended that no direct irrigation should be undertaken under Samanala Wewa as the irrigable area also formed the catchment area of the Uda Walawe Reservoir and as a result there was the danger of silting of the Uda Walawe Reservoir. Secondly, the terrain immediately above Samanala Wewa was difficult and channel construction for direct irrigation of the land immediately below Samanala Wewa was bound to be expensive. Thirdly, the irrigable area under Uda Walawe had been increased from 50,000 to 60,000 acres and the storage capacity of the Uda Walawe raised by 24,000 acre feet and supplementary water issues was, therefore, necessary for Uda Walawe Reservoir from the Samanala Wewa Reservoir. Instead of direct irrigation under the Samanala Wewa the Committee has suggested that a link channel to Mau Aru Reservoir be constructed and that this reservoir be restored and the irrigable land of 20,000 acres be brought under this reservoir. The construction of the reservoir will not be necessary. This modification as well as some other minor changes have been communicated to the Consultants. The final report dealing with specifications and tender documents will be submitted by the Consultants in the first half of 1966. The estimated cost of the work is Rs. 180,000,000 and the power transmission system is Rs. 38,777,500. If the Government approves the Scheme, work can commence in 1967.

(11) *Mahaweli Ganga Basin.*—The Mahaweli Ganga drains an area of 4,034 square miles of which about 2,500 square miles are jungle. The river begins in mountainous country rising to an elevation of about 7,000 feet and flows 120 miles to empty into the sea near Trincomalee. 920 miles of the catchment

area are in the wet zone which has a rainfall varying from 75 to 120 inches. The balance 3,114 square miles are in the dry zone which receives an annual average precipitation of 50 to 75 inches. The catchment in the wet zone receives the greater portion of the rainfall during the South West Monsoon, April to September, while the central and northern zones of the catchment area receive the major portion of their rainfall during the North East Monsoon, October to March. The average annual run-off of the river at Kandy is about 2 million acre feet at Minipe and the mean annual yield of the entire basin may be in the order of 6 million acre feet. The water resources of the Mahaweli can irrigate about 600,000 acres.

An area of 250,000 acres only is available on R. B. of Mahaweli ganga for development within the basin itself leaving another 350,000 acres to be found outside the basin.

The North Central Province representing an area of 4,140 square miles is covered with jungle interspersed with areas of cultivation and storage reservoirs which collect and hold the natural run-off for irrigation and other uses. The economy of the area is based on agriculture and is subject to the vagaries of the North East Monsoon. Although the area usually receives an annual precipitation of 50 to 75 inches, 80 per cent of which records from October to February, there are wide variations from season to season. Occasionally there are years when very little precipitation occurs. As a consequence agriculture entirely based on rainfall is highly precarious. Crop failures, partially restricted cultivation, low yields or one crop per year are still the results after determined efforts to create a better agriculture. The diversion of the Mahaweli Ganga will change the economy of this area completely. The Mahaweli Ganga rising in the mountains above Kandy and draining the large river basin in Ceylon has a favourable location and abundance of water for diversion purposes. Tanks like Kantalai in the Trincomalee District which also does not have an assured supply of water will also benefit. The power potential of Mahaweli is also good.

The diversion of the Mahaweli Ganga to the North Central Province was investigated by the United States Operations Mission to Ceylon and the Irrigation Department from 1958 to 1961. A feasibility report was submitted for the diversion of the Mahaweli from Primrose near Peradeniya. The scheme provided for the Nugawela dam and reservoir to be located on the Kotmale Oya about 5 miles above the junction with Mahaweli Ganga with a dam rising 360 feet above the river bed and a reservoir of storage capacity 420,000 acre feet. The power installation provided for a 120 M. W. plant. The diversion channel to the N. C. P. was to commence at Primrose and bear northwards about 125 miles to its terminus east of Vavuniya. The capacity of the channel at its origin was to be 2,500 c. ft. Two power stations were proposed, the Ukuwela power plant with a capacity of 45 M.W. and the Diggala power plant of 45 M. W. capacity. An additional power plant of 33 M. W. capacity was to be located at Lenadora. The diversion channel was expected to benefit 97,000 acres of existing land and 155,000 acres of new land. Lateral systems were expected to benefit an additional 30,000 acres and return flows a further 30,000 acres making the total irrigable area of new lands 215,000 acres. Part of the water of the diversion channel was to be diverted to the Sudu Ganga, Ambanganga basins and to flow to the proposed Moragaha kanda reservoir of 465,000 acre feet to benefit the Elahera, Kantalai and Angammedilla systems. This reservoir was expected to benefit 66,800 acres of existing land and 110,000 acres of new land. The estimated cost of the diversion scheme as prepared by the U. S. O. M. and the Irrigation Department was Rs. 1,203 million.

Before a final decision was made on the diversion Government decided that the full resources of the Mahaweli be examined so that the optimum use could be made of the resources. Due to various reasons United States aid was no longer available and a Project Memorandum was presented to the U. N. Special Fund for the investigation of the Mahaweli Ganga basin as a whole and had been accepted. The U. N. Special Fund contribution to the Project is Rs. 6,163,900 ($ 1,297,650) and the Ceylon contribution is Rs. 5,284,000 ($ 1,112,398). The team of experts arrived in 1965 and commenced work on the project.

The Feasibility Report will be ready by the end of 1966 and thereafter detailed plans and specifications will be prepared for phased projects. Much work is involved in the investigations, the engineering surveys involved cover an extent of 8,000 square miles or roughly ⅓ the area of Ceylon. A team of about 130 surveyors were diverted for the necessary work and the surveys are proceeding according to schedule. About 15 local engineers are attached to the Project. Detailed drilling investigations for the reservoir bed and bund as well as channel traces have to be carried out.

The team is investigating several alternative proposals—

(1) The Primrose diversion for which the Feasibility Report is available.

(2) Diversion of the Mahaweli Ganga through Ambanganga using the first 43 miles of the Primrose diversion.

(3) Diversion of the Mahaweli Ganga from Polgolla using the natural drainage lines starting with Suduganga connecting up with Ambanganga and thereafter Dambulu Oya, Mirisgoni Oya, Sigiri Oya and Yan Oya and feeding Kalawewa, Nachchaduwa, Nuwarawewa, Huruluwewa and Mahakandarawa.

(4) Reservoir at Randenigala with a storage capacity of 2 million acre feet irrigation of 250,000 acres on the R. B. of Mahaweli and diversion of surplus water to N. C. P.

The feasibility report of the U. N. Special Fund Team will be ready by end of 1966. Detailed specification and estimates will thereafter be prepared for specific projects under the overall scheme of development of the basin on a phased plan.

(12) *Kelani Ganga Basin.*—The Kelani Ganga is one of the main rivers of Ceylon with a catchment area of 890 sq. miles and flows from Adam's Peak through tea and rubber plantations to the sea at Colombo. Two tributaries of this river Kehelgamuwa Oya and Maskeliya Oya have now been tapped for production of Hydro-power.

The full hydro potential of the Kehelgamuwa Oya has been tapped with the installation of a 50 M. W. Station at Norton and a 50 M. W. station at Lakshapana. A detention reservoir at Castlereagh and a regulating reservoir at Norton Bridge of 43,800 and 730 acre feet capacity respectively supply the water for power. The length of the tunnels from Castlereagh to Norton Power Station is 4½ miles and from Norton Reservoir to Lakshapana is 1⅛ miles.

Plans for development of hydro potential of 172·55 M. W. of Maskeliya Oya Valley are contemplated in 3 stages as follows :

Stage I	This stage of the work has commenced and is expected to be completed in 1969. It provides for construction of Mousakele reservoir of 88,000 acre feet capacity, a tunnel of 5 miles length and a power station with installed capacity of 75 M. W. and capable of producing 330,000,000 units.
Stage II	Will utilise the water from the Mousakele reservoir for a production of a further 75 M. W. at Lakshapana adjacent to the present Laksapana power station. The plans provide for a diversion dam and a tunnel 2·3 miles.
Stage III	Provides for construction of a power station 22·5 M. W. at Theberton upstream of Lakshapana using the water of Mousakele Reservoir with a tunnel 4 miles.

Yearly floods of the Kelani Ganga cause considerable damage to land and property in addition to much hardship and inconvenience to about 250,000 people. At present flood control is effected by levees on the left bank which protects the City of Colombo and a levee on the right bank which protects the area North of Colombo. A feasibility report on Kelani Ganga Basin for flood control and utilization of water potential of the Basin with a view to flood protection, Development of Power and Irrigation was prepared by Technopromexport of Moscow in 1961. The proposal envisages construction of (*a*) Two Reservoirs, one at Nawata Parussella on the Main River and the tributary We Oya with a normal capacity of 718,000 ac. ft. and an additional flood storage of 586,000 ac. ft. and the other at Holombuwa across Gurugoda Aru with a normal capacity of 62,000 ac. ft. and a flood storage of 113,000 ac. ft., (*b*) Production of 33 M. W. of Hydro-Power at Parussella, (*c*) Diversion channel for trans-basin diversion to irrigate 146,500 acres of new land, (*d*) Levee system on both banks of the river from Pugoda to Sea Outfall for protection of Colombo and North of Colombo. The estimated cost of the Project is 921·7 million rupees of which 245·0 Million rupees are the foreign costs and 676·7 million rupees are the local costs. The Benefit cost ratio is ·63.

As the project cost is very high, it was proposed to modify the scheme to make the project more economical and feasible. The modified proposals provide for—

(*a*) The construction of four reservoirs, viz. (1) Nawata-Parussella on the main river and the We Oya (2) Yogama on the Sitawaka Ganga (3) Holumbuwa on the Gurugoda Oya and (4) Ampagalla on the Ritigal Oya.

(*b*) The installation of a hydro-power plant at each reservoir with a total installed capacity of 54·5 megawatts and the generation of 235 million watts of firm energy and 120 million watts of secondary energy a year.

(*c*) Strengthening the existing levees on both tanks of the river and raising by 2 to 3 feet half a mile of the R. B. levee from the Talwatte end.

(*d*) Construction of a tunnel 8 miles long from Holumbuwa Reservoir, to the Attanagalla Oya to meet any shortage of irrigation requirements in the Attanagalla Oya Scheme.

The entire modified scheme is estimated to cost about 450 million including interest during the construction period as against Rs. 921·7 million which is the estimated cost of the scheme formulated by the Russian Engineers. In addition to the power generated, the scheme will protect about 48,000 acres of land from floods, increase agricultural produce in the flooded areas, increase value of land, provide water supply to Avissawella, Ruwanwella, Karawanella and Yatiyantota and improve navigation facilities in the river up to Hanwella. The Benefit Cost ratio is about 0·73 which is an improvement on the previous figure, not taking into account several direct and indirect benefits which are difficult to be assessed in terms of money. Detailed investigations of the modified schemes are being made.

13. *Kalu Ganga Basin.*—The Kalu Ganga, one of the largest rivers in Ceylon, has its source at Adam's Peak, at an elevation of 7,350 ft. and flows through Rubber and Tea Estates in the hilly region and through Paddy and Coconut cultivation in the lower Basin before it reaches the sea at Kalutara.

The two largest towns in the basin are Ratnapura and Kalutara and their populations are about 16,500 and 20,300 respectively. The average rainfall is 68·80 inches during the N. E. Monsoon and 91·34 inches during the S. W. Monsoon.

Frequent flows effect the cultivations and habitations in the basin from Ratnapura downwards. The maximum flood worked out from the rainfall data is estimated at 250,000 cusecs with a flood volume of 2 million acre feet for a flood duration of 16 days. About 13,000 acres of paddy lands are affected by these floods.

The existing flood protection schemes in the lower basin protects about 5,457 acres of paddy lands.

The basin being highly developed, the construction of flood absorption reservoirs is not economically feasible. However, a site on the main river at Mihitiya has been selected so that the minimum developed area will be submerged. Its catchment area is 129 sq. miles and storage capacity of the reservoir is about 700,000 ac. ft. including a temporary flood detention of 100,000 ac. ft. It is also proposed to instal a 28,000 K.W. power plant generating an annual firm energy of 122,000,000 k.w.h. and 23,000,000 k.w.h. of secondary power.

The cost of this project would be about 80 million rupees with 48 million rupees as foreign costs and 32 million rupees as local costs.

Tenders are called for the preparation of a Feasibility Report for this Project.

(14) *Gin Ganga Basin.*—The Gin Ganga Basin is located in the South Western end of the Island of Ceylon and drains an area of about 370 sq. miles. The Basin is fairly well developed and consist of Tea and Plantations in the Hill Country with small patches of paddy cultivation along the banks of the river. Coconut, cinnamon and paddy are cultivated in the lower reaches. The total cultivated land in the basin covers approximately 50% of the total basinal area, with about 28,000 acres under paddy. About 12,800 acres of paddy lands are below the proposed Reservoir Site which is subject to flooding. At present, there are minor flood protection works which were meant to protect about 9,800 acres. However, the land owners are dissatisfied as this scheme has created greater problems.

The only effective and permanent solution is obviously the construction of flood detention reservoirs in the upper reaches of the valley.

Madugeta Reservoir.—This site has a catchment area of 68·0 sq. miles and will have a capacity of about 100,000 ac. ft. which will have a pronounced effect in the control of floods in the river basin. Along with flood control it will be possible to irrigate about 12,000 acres of land for Maha and 8,000 acres during Yala and generate 5,000 K.W. (firm) Hydro-power. The cost of this project would be about 12 million rupees of which 7·2 million rupees are foreign costs and 4·8 million rupees local costs.

Tenders are called for the preparation of a Feasibility Report.

(15) *Nilwala Ganga Basin.*—Nilwala Ganga, a major river of the Island, has a total drainage area of 375 sq. miles with a yield of 1,000,000 ac. ft. of water at the mouth of the river.

The most important town in this basin is Matara whilst the other two noteworthy towns are Akuressa and Morawaka.

The existing paddy fields, which are mainly in the lower Basin cover an extent of about 40,000 acres and are subject to frequent floods every year.

This Basin is exposed to both monsoons, namely, South-West and North-East monsoons, and receives a mean annual rainfall of 115 inches (average for the entire Basin). The maximum flood was recorded in May, 1940, and the total flood volume that entered the sea in its duration of 5 days was about 380,000 ac. ft.

The existing Minor Flood Protection Scheme safeguards about 5,750 acres of paddy land, and this by no means is a solution for the Major Flood Problems of this Basin.

Proposals have been framed to construct two multi-purpose Reservoirs, one across Urubokke Ganga at Siyambalagoda and another across Hulandawa Oya.

Siyambalagoda Reservoir, with a catchment of 72 sq. miles would store 141,000 ac. ft. of water. It has an Irrigation Potential for 17,500 crop acres of paddy and could produce 1,875 k. W. of power per annum.

The Rulandawa Reservoir intercepts a catchment of 29 sq. miles. It has an Irrigation Potential of 10,500 crop acres per annum with a storage of 70,000 ac. ft. of water. Power produced will be 700 k.W. per annum.

Approximate cost of the project would be Rs. 30 million of which 18 million rupees as Foreign Cost and 12 million rupees for local costs.

Tenders are called for the preparation of a Feasibility Report for these proposals.

APPENDIX A

PROPOSED ITEMS FOR INVESTIGATIONS

During 1966-1970

Basin	Name of Project	Proposed Irrigable Extent Acres	Approximate cost in Million of Rupees	Preliminary Drillings							Final Dam Axis Alignment	Designs Head-works	4 Chain Eng. Surveys by S.G.		
				Report based on Topo Studies	Reservoir Bed Survey by S.G.	Dam Axis Surveys	Head Works Dam and Sluices	Spill Site	Borrow Area	Geological Report			Total to be done	Due to Date	Balance to be done
Heda	Heda Oya Reservoir	30,450	95·1	Done	Done	Done	Done	Done	—	—	Done	—	80,000	30,000	50,000
Karanda Oya	Karanda Oya Reservoir	12,450	23·4	Done	—	—	—	—	—	—	—	—	85,000	10,000	75,000
Mi Oya	Inginimitiya Reservoir	40,000	130·0	—	Done	Done	—	—	—	—	—	—	100,000	—	100,000
Deduru Oya	Ridi Bendi Ela Reservoir														
Yan Oya	Horowapotana Reservoir	33,800	105·6	Done	Done	Being Done	Being Done	Done	—	—	—	—	28,000	—	28,000
Kirindi Oya	Tanamalwila Reservoir	23,035 (One cultivation	82·0	Done	To be done 1966	—	—	—	—	—	—	—	33,000	10,000	25,000
Mundeni Aru	Maha Oya	14,969	69·7	Done	Done	Done	—	—	—	—	—	—	22,000	5,000	17,000
	Gallodai Aru Reservoir	13,000	42·8	Done	Done	Done	—	—	—	—	—	—	—	—	—
Parangu Aru	Parangi Aru Upper Reservoir	8,200	23·	Done	Done	—	—	—	—	—	—	—	—	6,000	—
Pali Aru	Pali Aru Rservoir	2,100	6·5	Done	Being done	—	—	—	—	—	—	—	—	—	—

CHAPTER VI

LIFT IRRIGATION

Lift Irrigation

1. The non-development of highland areas in colonisation schemes had been one of the adverse features of land development. Primarily, the cause of this is the lack of irrigation for highlands. Development of the highlands in existing colonisation schemes can be achieved at reasonable expense as the cost of land development and settlement of colonists is not involved. The development of highlands can only be taken in those colonisation schemes where there is no shortage of water for the cultivation of existing lands. Most of the highlands in existing colonisation schemes have not been planned out so that it is difficult to obtain contiguous blocks of highland for development under agriculture. Another difficulty is that part of the highland lots of individual allottees has been partially developed for housing as well as for permanent crops. Lift irrigation is necessary to irrigate these highlands. No work has been done on lift irrigation by the Irrigation Department hitherto. With the need for achieving self-sufficiency in subsidiary food crops, the development of the highland areas in colonisation schemes with irrigation by lift assumes urgency. Plans have been prepared for the development of 10,000 acres under existing colonisation schemes in subsidiary food crops.

In addition about 5,000 new acreage has been selected for development under lift irrigation from rivers and channels for the cultivation of subsidiary food crops.

2. The particulars of the areas selected under the 2 categories referred to in the preceeding paragraphs are as follows :—

(1) LIFT IRRIGATION IN HIGHLANDS OF EXISTING COLONISATION SCHEMES

Scheme		*Highland lots* *Acres*
1. Pavatkulam	RB	200
2. Morawewa	LB	800
3. Minipe	Old Extension	800
	Extension	300
4. Mahakanadarawa	LB	780
5. Padaviya	RB	550
6. Rajangana	RB	1,500
	LB	1,000
7. Akkarayankulam	LB	150
	RB	150
8. Vavunikulam	RB	550
	LB	800
	Centre	100
9. Usgala Siyamalangamuwa	RB	50
10. Hakwatuna Oya	RB	450
	LB	150

Scheme		*Highland lots* *Acres*	
11. Giritale	RB	400	
12. Mahawillachchiya	RB	200	
	LB	170	
13. Iranamaduwa	RB	350	
14. Etimole Wewa	LB	200	
15. P. S. S.		350	
		——	10,000

(2) Lift Irrigation in Youth Settlement Schemes—

Gal Oya LB 3,000, Wellangiriya 1,200 acres and Hiriyala 800 acres 5,000

Ground Water Resources

3. The services of Dr. Kurt Mendel, M. Sc., Ph. D. from Israel was obtained to go into the causes of the decline of the Citrus cultivation in Ceylon. In his report he had mentioned " Suitable soils for citrus as characterized above are mostly found in the Dry Zone where, of course, additional irrigation is necessary. These are mostly highland soils where the irrigation lift would have to be about 15–20 feet. A promising area of this kind has been pointed out to the author in the Mullaittivu area. A large area of suitable soils (red-yellow) Lathosols (sand) has been pointed out to the author by the Director of Land Use between Puttalam and Mannar. This area, which resembles in its landscale structure of sandy areas of Florida, could be used for the development of a large citrus industry. But a prerequisite for this development is the establishment of irrigation facilities. Therefore this area is envisaged for development in the future."

4. Mr. Yosef Gavriell, Director of the Agricultural Planning and Development Centre of Israel, visited Ceylon to report on what further aid the Israel Government could give Ceylon in the development of the Citrus Industry in particular and the Dry Zone in general. An extract from his report is as follows :—

> " An area particularly worthy of examination for the exact location of the settlement might well be the Kala Oya delta area. The soils and general conditions appear excellent for large scale citrus cultivation provided sufficient and suitable water resources are established. The survey of the area for underground water, best conducted in close co-operation with Dr. Panabokke, is thus a prerequisite for any development of the region and must be given top priority. As the potential of this area is practically untapped, it would seem particularly suitable for the establishment of a Comprehensively Planned Development Region, should the Ceylon Government decide on such a course. The settlement should therefore be planned with this in view and would be based primarily on citrus with supplementary cash crops, livestock, poultry etc. as according to Dr. Panabokke only some 60% of the 1,000 square miles of this area are suitable for citrus, leaving considerable areas for pasture and other purposes. "

5. He recommended the services of a Hydro-Geologist and a Farm hand from Israel. Dr. Arad, a Hydro-Geologist from Israel, visited the Island early in 1965 and an extract from his report on the availability of ground water in the North-Western coastal belt is as follows :—

"Nevertheless, it was proved that permeable Jaffna Limestone underlies a belt of 7–15 miles width along the North-West Coast, from Puttalam all the way up to Jaffna. This stratified rock formation, with a thickness ranging from 200 ft. to 600 ft. was deposited in a very shallow sea, during the Miocene period. The sedimentary environment of the Jaffna limestone is that of a reefal formation, including rock debris with high original porosity. A further development of the porosity and permeability was caused by circulating fresh water, annually replenished by the percolation of precipitations. In spite of the fact that the outcrops of the Jaffna Limestone are rarely well exposed, it is quite obvious that the porous overburden of the alluvial soils and the young clastic formation is a medium which does not disturb the down seeping of rain water.

Another working hypothesis assumes the existence of Jurassic Sandstone between the Jaffna limestone and the Basement Complex (of impervious crystalline rocks). This rock unit is also promising as a water bearing formation according to surface samples I checked East of Puttalam. It means that both sedimentary units, combined or separately, might perform as a huge aquifer charged with fresh water. Another favourable condition is the fact that this aquifer has only one contact with the sea and that to the west. To the east it is bounded by impervious crystalline rocks which would not deteriorate the quality of the fresh water in the aquifer. Local salinity problems caused by stagnant water in the uppermost part of the aquifer might occur. These could be overcome however, by penetrating to the water bearing horizons.

So far only one site in this region has been tested and there are some positive results. A water well has been sunk at Silavaturai, via Mannar to the temporary depth of 149½ feet. At the depth of 100 ft. the Jaffna limestone was encountered. The water table was struck at 112 feet and rose to the depth of 77 ft. below surface by its own hydraulic head. Chemical analysis of a water sample indicated rather high salinity with chlorinity reaching 960 ppm. Until this well has been deepened and pumped properly this result is not conclusive. Further exploration of the above mentioned area will supply the essential data which is needed for definite conclusions. This is normal in Hydrogeology which is to a large extent based on trial and error.

Before ending this short report I believe it is worthwhile to mention possibilities of ground water development in other parts of the Island which are considered as "dry". Those areas in the East and South are covered by crystalline rocks. By detailed subsurface research, based on field work and geophysics (surface reassistivity method), old river beds and several other alluvial clastic deposits could be located. Such rock formations might contain considerable quantities of ground water that could solve local water problems."

6. A separate division in the Irrigation Department has been set up to deal with Lift Irrigation from surface sources and the development of ground water sources. A deep well located at Silavaturai in the Mannar area was developed and yield tests were carried out with a tube well pump. It has been found that the well can yield about 300,000 gallons of water per 10 hours of pumping and the recuperation rate is quite satisfactory. Samples of water have been sent to the Government Analyst for carrying out analysis. The Ministry of Land, Irrigation and Power with a view to intensifying the underground water surveys submitted a Cabinet Paper for the purchase of a rotary cum percussion drill and for obtaining the necessary experts from Israel. The order for the machinery has already been placed by cable and is expected in about March 1966. Negotiations were also carried out with the Israeli authorities for obtaining the services of hydrogeologist, master driller and irrigation engineer for laying out the lift irrigation system. The provision of lift irrigation requires heavy investment in pumps and other equipment. It is proposed to confine lift irrigation to pumping the water from surface sources as well as wells, and sending the water along line and unlined channels depending on the nature of the soil. The introduction of sprinkler equipment will be carried out on an experimental basis. The requirements of equipment and cost involved are as follows :—

Equipment	*Nos.*	*Cost* *Rs.*
Pumps	425	1,385,000
Pipelines, casings, &c.		2,146,000
Groundwater investigations	5	1,700,000
Well casings and pumps		1,600,000
Sprinkler		2,000,000
Transport vehicles	14	169,000
		9,000,000

The world Bank Team on Agriculture and Irrigation which was in Ceylon recently considered with favour the provision of assistance for lift irrigation. A Project Memorandum on Lift Irrigation was handed over to the Members of the Team along with the 5 Year Programme of the Department of Irrigation.

7. The programme in the Five Year Plan provides for the purchase of 5 additional rotary cum percussion drills for carrying out the exploitary tests for ground water resources and exploitation in the Dry Zone areas of the Island depending on the availability of an adequate supply of ground water. It is proposed to develop citrus cultivation on an expansive scale as well as 5,000 acres in subsidiary food crops. The programme of lift irrigation is given in Appendix A to this Chapter.

Ground Water Resources of the Jaffna Peninsula

8. Over recent years concern has been expressed by the people of Jaffna Peninsula that the fresh water table has fallen by so many feet over the last several years. Reasons adduced for the lowering of the fresh water table were :—

(*a*) Increased consumption of subterranean water on account of increase in population.

(*b*) The increase on draw of subterranean water on account of the mechanical agricultural pumps.

(*c*) The increased run off of rain water without percolation into the soil, due to increase in metalling of roads, cutting of drains silting up of ponds and filling up or depressions on the ground for utilization for building.

9. This matter was brought up at the District Co-ordinating Committee meeting and brought to the notice of the Ministry. The services of the hydro-geologist who was in Ceylon were to advise on the problem of growing salinity of the Jaffna ground water resources. An extract from Dr. Arnon Arad's report is given below :—

> " The water table in the Peninsula never exceeds two feet above Mean Sea Level. The nature of the Jaffna Limestone aquifer is of reef facies, containing sections with very good hydraulic conductivity, leading to the highly developed Karstic System of solution channels. According to the hydrostatic balance between freshwater body floating on sea water (Herzberg Phenomenon), the interface of the two bodies occurs at the depth of 37 units, comprising to one unit of the freshwater table.
>
> Thus, nowhere in the Peninsula is it reasonable to exploit groundwater from a depth exceeding 50 feet. In fact the dispersion zone is even higher and the potable saturated section might be thinner. This delicate balance is clearly shown in the Puttur well, which though 8 miles from the ocean, is still affected by tidal movements.
>
> The Galleries System of the Municipal Water Supply, although heavily pumped, has proved itself as a satisfactory method of exploitation of groundwater, under the intricate hydrological regime of the Peninsula.
>
> By encouraging people to dig more wells and changing the pumpage capacities, local cones of depression are forming, leading to sea water encroachment. On the other hand, it is almost certain that in other locations, where exploitation is not properly spaced, there is a loss of fresh water to the ocean.
>
> In order to make a careful study of the groundwater balance of the whole peninsula as a single equiferial unit, the following steps would seem indicated :
>
> (1) To take absolute level elevations of all water wells in the Peninsula.
>
> (2) To carry out periodical simultaneous water table elevation measurements. All measurements should be completed in each case within a

period of one week. It is essential that these measurements should be taken by reliable and trained personnel under expert supervision and direction.

(3) While water levels are recorded, water samples from the bottom of the wells should be taken and analysed for their main chemical constituents (Ca, Mg, M_1, SO_4 and HCO_3).

(4) In the meantime, it is recommended that the authorities will refrain from allowing any further exploitation of the depleted aquifer, viz. to freeze all exploitation activities to the present level, otherwise serious damage can result which can only be rectified over a prolonged period.

It is well known that Israel is suffering similar acute conditions in certain areas and therefore, its experience in dealing with these problems could be well utilized, both in the technical field and with regard to legislation and administrative measures. "

10. In accordance with the advice given by Dr. Arad a Committee was set up consisting of the representatives of the Irrigation, Geological Survey Department and Water Supply, G. A. Jaffna, and others to work out a detailed scheme for carrying out investigations. The terms of reference of the Committee were as follows :—

(1) the collection of hydrological data to find out the water balance ;

(2) to recommend measures to re-charge the underground water resources ;

(3) to educate the cultivators in the proper use of water for their cultivation by not over-irrigating their crops ;

(4) to introduce legislation, if necessary, to control the sinking of wells and the installation of power pumps.

Over 400 wells have been selected spread over the Jaffna Peninsula for carrying out detailed investigations of the water balance of the peninsula. The water levels in the wells have been regularly measured and the observations recorded. Samples of the water at the bottom of the wells are being analysed regularly with the help of the Science Teachers in schools which have Science Laboratories through the Northern Province Science Teachers' Association.

11. Once the observations and analysis of samples of water have been carried out over a long period of time 1 to 1½ years—the services of an Israel Expert Hydro-Geologist will be obtained to analyse these investigations, draw up necessary conclusions from them and recommend remedial measures.

APPENDIX A

LIFT IRRIGATION PROGRAMME

	Total	1966	1967	1968	1969	1970
(1) Highlands in existing Colonisation Scheme	10,000	1,000	2,000	2,000	2,000	3,000
(2) Youth Settlement Scheme	5,000	1,000	1,000	1,000	1,000	1,000
(3) Ground water lift for subsidiary food crops	5,000	—	500	1,000	1,700	1,800
(4) Ground water lift irrigation for Citrus (tentative)	5,000	—	500	1,000	1,500	2,000
	25,000	2,000	4,000	5,000	6,200	7,800

CHAPTER VII

MACHINERY AND EQUIPMENT FOR THE FIVE-YEAR PLAN

1. The rate of development of irrigation facilities hitherto was about 10,000 to 12,000 acres under major and minor irrigation works. The five year programme envisages acceleration of the programme to provide irrigation facilities to 30,000 to 40,000 acres per year. The amount of earth work and jungle clearing involved at present for the production of irrigation facilities to about 11,000 to 12,000 acres is 500 acres of jungle clearing and 400.000 cubes of earth work. The annual programme of provision of irrigation facilities to 30,000 to 40,000 acres in the five-year plan will involve jungle clearing of about 1,500 acres and earth work involving about 1,500,000 cubes.

2. The Irrigation Department has about 130 Class I Tractors, 40 Motorised scrapers, 27 Motor Grades and a large number of lorries, jeeps and other equipment, but the percentage of availability of this equipment for construction work is about 35 per cent. The main reason for this is that about 30 percent of the equipment is over 15 years old and another 30 percent over 10 years old. Some of these equipment were purchased second-hand from War disposal stocks. Most of these equipment and machinery have out-lived their useful lives and are maintained and repaired at heavy expense. Only about 40 percent of the equipment is comparatively new, being between 5 to 10 years old. Very little equipment has been purchased between 1961 and 1965 due to various difficulties, mainly the exchange problem. A statement giving a list of machinery with ages and new machinery reqûired is at Appendix A to this chapter. Under the circumstances heavy replacement of machinery and additions are necessary if the five year programme is to be achieved. Equipment to the value of Rs. 27,000,000 inclusive of the Rs. 4,000,000 allowed in the current year's budget is required for the construction of major and medium scale works.

3. The Department's annual requirements of large size rubber tyres is about 150. These vary from sizes 10,000×20 to 1,800×24. At present there are no facilities in Ceylon to have these large size tyres re-built though the worn

out tyre carcase can be re-built three times. In addition to these large sizes· the Department requires tyres of about 500 to 300 lorries and jeep tyres. The approximate annual cost of large tyres is about Rs. 250,000 while the lorry and jeep tyres cost about Rs. 120,000. Provision is accordingly made for the installation of a tyre rebuilding factory plant under the equipment required for major and medium scale works.

4. The present output under village works is about 15,000 acres. The target under village works in the five-year programme is 10,000 acres per year. Investment in improvements of village works has a popular impact besides providing for increase in production at little or no cost involved in settlement of colonists. Some of these village tanks are situated in isolated areas so that speedy construction is not possible due to lack of contractors and experienced labour in the villages. The requirements of machinery provide for about five mobile mechanised units at a cost of Rs. 5,000,000 for the construction of village works.

5. The requirements of machinery and equipment for drainage and reclamation works is Rs. 8,000,000 and for lift irrigation works Rs. 9,000,000. The total requirements of machinery for the five year plan period is Rs. 49,000,000 as given in the statement below :—

	1965–66	*1966–67*	*1967–68*	*Total*
Major and Medium scale works	11,000,000	8,000,000	4,000,000	23,000,000
Village works	3,000,000	2,000,000	—	5,000,000
Drainage and reclamation works	5,000,000	2,000,000	1,000,000	8,000,000
Lift Irrigation	4,000,000	3,000,000	2,000,000	9,000,000
Already applied for	4,000,000	—	—	4,000,000
Total	27,000,000	15,000,000	7,000,000	49,000,000

Appendices 'B' or 'F' to this chapter give details of machinery required.

APPENDIX A TO CHAPTER VII

Description	Equipment 15 years and over purchased before 1950	Equipment 10 years and over purchased between 1950–55	Equipment 5 years and over purchased between 1955–60	Total	Equipment purchased between 1961–65	New Equipment Required: Major and medium works	New Equipment Required: Village works	New Equipment Required: Lift Irrigation	New Equipment Required: Drainage	New Equipment Required: Current year's allocation of Rs. 4 million	New Equipment Required: Total
1. Motorised Scrapers	8	6	26	40		21	12			6	39
2. Tractors											
(i) Cl. I	37	43	50	130		29	8			4	41
(ii) Cl. II			11	11		8	6			2	16
(iii) Cl. III		4		4							
(iv) Cl. IV	11	8	7	26							
3. Motor Graders	3	7	17	27		6					6
4. Compressors	34	3	18	55	2	6				3	9
5. Baby compressors	5	3		8		10					10
6. Water Pumps	121	135	9	265		28		410	19	12	469
7. Hydraulic rippers						4					4
8. Rear Dumpers			9	9		16			15	3	34
9. Bottom Dumpers	12			12		10					10
10. Excavators	26	8		34		3					3
11. Road grabs						3					3
12. Road Roller	20		2	22		2					2

13. Back Hoe						2					2
14. Vibrator		28		28		20					20
15. Tampers	35		11	46		25					25
16. Drill Hammer						25					25
17. Conveyors, sand & stones		3		3		3					3
18. Generator sets	9	35	101	145	12	7					7
19. Tippers, lorries, Bowsers	73	44	104	221	9	69	8	2		10	89
20. Willys Jeep and Station wagon	32	44	84	160	16	62	30	8		2	102
21. Vans Pick ups	1	26	48	75	4	10	4	3			17
22. Grouting Machine	3	2		5		2					2
23. Cranes	6	3	3	12	19				4		4
24. Tractors and Trailers							4			12	16
25. Sledge Pumps						12					12
26. Rotary and Percussion Drill								5 4			5 4
27. Deep well Test Pumps									3	1	4
28. Suction dredger									2	1	3
29. Grab dredger										2	2
30. Trenching Machine											

APPENDIX · B

FIVE-YEAR PROGRAMME OF DEVELOPMENT, 1966 TO 1970

Machinery Requirements for Major Works and Medium Scale Works

Description	*1965–66*		*1966–67*		*1967–68*		*Remarks*
	No.	*Cost Rs.*	*No.*	*Cost Rs.*	*No.*	*Cost Rs.*	
Motorised Scrapers	10	2,300,000	15	3,450,000	6	1,380,000	
Tractor Class I	15	2,400,000	10	1,600,000	4	640,000	
Tractor Class II	5	275,000	3	165,000			
Motor Graders	3	300,000	1	100,000	2	200,000	
Compressor 500 c.f.m.	3	120,000	3	120,000			
Baby Air Compressor 20 c.f.m.	5	75,000	5	75,000			
Water Pumps (Portable) 3" (High Lift 2,250')	10	30,000	10	30,000			
Water Pumps (Portable, 5 Cusecs)	6	180,000	2	60,000			
Hydraulic Ripper	3	180,000			1	60,000	
Rear Dumpers	4	600,000	6	900,000	6	900,000	
Bottom Dumpers	2	300,000	4	600,000	4	600,000	
Tyre Rebuilding Equipment	1	1,000,000					
Excavators (Marion) 1⅛ to 1¼	1	500,000					
Excavators (Marion) 1 cu. yd.	2	400,000					
Rocks Grab 4 Prong	3	180,000					
Road Rollers 12 to 15	2	150,000					
Back Hoe (Crawler Type)	2	200,000					
Concrete Vibrators	10	30,000	10	30,000			
Pneumatic Tamper	15	37,500	10	25,000			

Drill Hammers for Rock Blasting	15	22,500	10	15,000		
Conveyors for Sand and Stone	3	120,000			3	120,000
Generator Sets 30 kW	3	105,000	2	70,000		
Tippers 5 ton	8	160,000	10	200,000	3	60,000
Lorries Diesel 5 ton	6	120,000	3	60,000		
Lorries Diesel 3 ton	12	240,000	11	220,000	2	40,000
Willys Jeeps	17	170,000	9	90,000		
Willys Station Waggons	15	225,000				
Jeeps—Pick-ups	6	54,000	4	36,000		
Station Waggons 4 wheel Drive	10	120,000				
Water Bowser	9	270,000	5	150,000		
Welding Jeeps	1	20,000				
Grouting Machine	2	30,000				
Rectifier Battery Charger	2	6,000				
Gunniting Machine	2	4,000				
10 ton Differential Pulley Blocks	5	5,000				
Radio Transmitter 100–150 Watts 230 Volts DC	6	9,000				
Sludge Pumps	12	60,000				
Total		10,998,000		7,996,000		4,000,000
		Grand total		22,994,000		

APPENDIX C

FIVE-YEAR PROGRAMME OF DEVELOPMENT, 1966 TO 1970

Machinery Requirements for Village Works

Description	1965–66		1966–67		1967–68		Remarks
	No.	Cost Rs.	No.	Cost Rs.	No.	Cost Rs.	
Motorised Scrapers	7	1,610,000	5	1,150,000			
Tractor Class I	4	640,000	4	640,000			
Tractor Class II	4	220,000	2	110,000			
Ferguson Type Tractor with Trailor	4	40,000					
Lorries 5 ton	4	80,000					
Tippers	4	80,000					
Pick-up Jeeps	4	36,000					
Jeeps	30	300,000	10	100,000			
Total		3,006,000		2,000,000			
Grand total		5,006,000					

APPENDIX D

FIVE-YEAR PROGRAMME OF DEVELOPMENT, 1966 TO 1970

Machinery Requirements for Lift Irrigation

Description	*1965–66*		*1966–67*		*1967–68*		*Remarks*
	No.	*Cost Rs.*	*No.*	*Cost Rs.*	*No.*	*Cost Rs.*	
***Pumps*—Total Head up to 100 ft.**							
1,500 g.p.m. Electric	5	60,000					
750 g.p.m. Electric	5	30,000					
1,500 g.p.m. Diesel	5	75,000					
750 g.p.m. Diesel	15	105,000	10	70,000			
500 g.p.m. Diesel	15	60,000	10	40,000			
250 g.p.m. Diesel	30	105,000	20	70,000			
100 g.p.m. Diesel	50	135,000	50	135,000			
50 g.p.m. Diesel	172	430,000	28	70,000			
Pipelines—Estimation on Aluminium piping including casings and joints—							
8 in. diameter	21,550 L. ft.	431,000	12,250 L. ft.	245,000			
6 in. diameter	20,000 L. ft.	300,000	18,000 L. ft.	270,000			
4 in. diameter	40,000 L. ft.	400,000	40,000 L. ft.	500,000			

APPENDIX D—(contd.)

FIVE-YEAR PROGRAMME OF DEVELOPMENT 1966 TO 1970

Machinery Requirements for Lift Irrigation

Description	*1965–66*		*1966–67*		*1967–68*		*Remarks*
	No.	*Cost Rs.*	*No.*	*Cost Rs.*	*No.*	*Cost Rs.*	
Sprinkler Irrigation Equipment						2,000,000	
Ground Water Equipment							
Rotory Percussion Well Rig Truck Mounted for holes up to 12 in. and depths up to 500 ft. complete with auxilliary equipment and some well casing	5	1,500,000					
Deep well Test Pumps	4	100,000					
Electric Well Loggers	2	20,000					
Resistivity Testers	2	5,000					
Seismic Explorers	2	10,000					
Water Quality Testing Equipment and Chemicals	Sum	65,000					
Well Casings 8 in.			10,000 L. ft.	300,000			
Screens, &c.			Sum	300,000			
Turbine Production Pumps			100	1,000,000			
Jeep Pick-ups	3	27,000					
Jeeps	5	50,000					
Trucks 3 ton	2	40,000					
Welding Jeeps	2	40,000					
Jeeps Station Wagon	1	12,000					
Total		4,000,000		3,000,000		2,000,000	
			Grand total	9,000,000			

APPENDIX E

FIVE-YEAR PROGRAMME OF DEVELOPMENT, 1966 TO 1970

Machinery Requirements for Drainage and Reclamation Works

Description	1965–66		1966–67		1967–68		Remarks
	No.	Cost Rs.	No.	Cost Rs.	No.	Cost Rs.	
Suction Dredger 10 in.	1	800,000	1	800,000			
Suction Dredger 8 in.					1	600,000	
Delivery Hose 10 in. and 8 in.		27,000					
Grab Dredgers 3/8 cu. ld.			1	125,000	1	125,000	
Barges self propelled	3	45,000	3	45,000			
Air Compressor 500 c.f.m.	3	120,000					
Rock Drills, Drill Hammers, Drill stems and Bits.		30,000					
Floating Crane 4 ton	1	500,000					
Crawler Crane 4 tons	3	1,500,000					
Euclid Rear Dumper	10	1,500,000	5	750,000			
Boats with driving Motors	3	15,000	3	15,000			
Miscellaneous Equipment, Generators, &c. and Field Service Units		277,000		60,000		50,000	
Axial flow 12 ft. lift							
50 Cusec (Diesel) Pumps	1	60,000	1	60,000	2	120,000	
25 Cusec (Diesel) Pumps					1	40,000	
10 Cusec (Portable) Pumps	6	126,000	5	105,000			
50 Cusec (Electrical) Pumps			1	40,000	1	40,000	
25 Cusec (Electrical) Pumps					1	25,000	
Total		5,000,000		2,000,000		1,000,000	
Grand total		8,000,000					

APPENDIX F

FIVE-YEAR PROGRAMME OF DEVELOPMENT, 1966 TO 1970

Machinery applied for Under Australian Aid for approximately Four Million in 1965–66

Description	*1965–66*		*1966–67*		*1967–68*		*Remarks*
	No.	*Cost Rs.*	*No.*	*Cost Rs.*	*No.*	*Cost Rs.*	
Motorised Scrapers	6	1,030,000					
Tractors Class I	2	640,000					
Crawler Tractors Class II	4	110,000					
Hydraulic Ripper 3 Tyne fitted to Class I Tractor	1	100,000					
Rear or side Dumpers	3	450,000					
Tipping Trucks Diesel 5T 4 Cu. yds.	4	80,000					
Lorries Diesel 5 ton	6	120,000					
Willys Wedling Jeeps 300 Amp.	2	40,000					
Mobile Crane 10 ton	1	110,000					
Suction Dredger 8 in.	1	300,000					
Pontoon Mounted Pile Driver 1/2 ton	1	30,000					
Trenching Machine	2	150,000					
8 in. Cutter Suction Dredger	1	300,000					
Grab Dredger	1	120,000					
Low Head Drainage Pump 25 Cusecs	4	220,000					
High Head Irrigation Pump 2 Cusecs	4	40,000					
Low Head Drainage Pump 10 Cusecs	4	80,000					
Soils and concrete Testing Machine		40,000					
Tractors with Trailors	2	120,000					
Total		4,080,000					

FIVE-YEAR PROGRAMME OF DEVELOPMENT, 1966 TO 1970

Summary of Expenditure—Machinery

	1965–66 Rs.	*1966–67 Rs.*	*1967–68 Rs.*	*Total Rs.*
Major and Medium Scale Works	11,000,000	8,000,000	4,000,000	23,000,000
Village Works	3,000,000	2,000,000		5,000,000
Drainage and Reclamation Works	5,000,000	2,000,000	1,000,000	8,000,000
Lift Irrigation	4,000,000	3,000,000	2,000,000	9,000,000
Already applied for (under Australian Aid)	4,000,000			4,000,000
Total	27,000,000	15,000,000	7,000,000	49,000,000

CHAPTER VIII

RE-ORGANIZATION OF THE IRRIGATION DEPARTMENT

1. To meet the expanded programme of provision of irrigation facilities, drainage, lift irrigation and investigations the Department of Irrigation is being re-organized. The Deputy Directors are being assigned specific functions in regard to various sections which they will be put in complete charge of. Two Deputy Directors are being placed in charge of major schemes and medium scale works on a regional basis. One Deputy Director will be in charge of village works and the Senior Deputy Director will be in charge of lift irrigation and drainage. One Deputy Director will be in charge of plans, designs and research section.

2. The Research Section will be re-organized and strengthened to undertake the planning and designs of the items under investigations list and the new items to be taken up for construction during the Five-Year Plan. The following sections are being re-organized in the Research Section :—

Hydraulics
Hydrology
Soil Mechanics
Geology
Land Use

No trained personnel are available in Ceylon for the Hydraulic Section, and an application will be made for the services of a Hydraulics Engineer either from the F. A. O. or under Colombo Plan. Necessary officers are available for Hydrology and Soil Mechanics Sections. Geology Section assumes importance in the context of development of ground water resources. A Geologist has been recruited from the Department of Geological Surveys. The services of an expert Hydro-Geologist from Israel is also being obtained in connection with the Hydro-Geological Survey. The Land Use Division has a qualified Officer in charge and his staff is being strengthened.

3. The programme of Lift Irrigation is a new venture and no staff is available at present. Two Engineers and a few Technical Assistants and Draftsmen have been released to this section. The services of an Israel Lift Irrigation Engineer is also being obtained to advise on the layout of lift irrigation systems. With the purchase of 5 drilling machines for under-ground water, a drilling foreman and drillers will be necessary for the maintenance and repair of the pumps which will be purchased for lift irrigating 20,000 acres.

4. The emphasis on Drainage Works will also require additional staff. No staff is available to man the dredgers and other equipment and pumps which are proposed to be obtained for the Drainage Section. Additional staff will be necessary for the drainage section also.

5. There is a severe shortage of Engineers and other Technical personnel. The shortage of Engineers is one which affects all Technical Departments in Ceylon. There is an acute shortage of Technical personnel for lower echnical grades. About 50 Technical Assistants are being trained annually but this number is not sufficient to cope with the expanded programme of the Irrigation Department. Besides, the Irrigation Department also supplies officers of this grade to the River Valleys Development Board and the Commissioner of Agrarian Services, as well as Government Corporations. It is proposed to expand the training facilities for Technical Assistants at the Training School at Galgomuwa and increase the intake of students to about 100 per year. An application has been made for the funds and equipment necessary for the expansion of the training school at Galgomuwa for this purpose. A sum of Rs. 3 million is required for the equipment and for the expansion of the school to increase the intake to 200 students.

6. The heavy construction programme also requires the re-organisation of the Ratmalana Irrigation Department Workshop. A Committee of Inquiry has reported on the re-organization necessary. Here again the difficulty has been the shortage of Mechanical Engineers and other Technical personnel. Preliminary steps to implement the recommendations of the Committee of Inquiry are being taken. The spares necessary have been ordered. The services of a Mechanical Engineer have been sought from the FAO for a short period. An application has also been made under the OPEX of U. N. Technical Assistance for the services of a Mechanical Engineer who can take charge of the Workshop in an executive capacity for a period of three years.

7. The works programme for the five year period together with staff requirements are given in Appendix A & B

5 YEAR PROGRAMME—DISTRIB

Name of Office	*Village Works* Acres					*Medium Scale Works* Acres					*Drainage and Reclamation Work* Acres			
	Years					Years					Years			
	1	2	3	4	5	1	2	3	4	5	1	2	3	4
Western Division														
Colombo ..	520	517	854	657	160	—	—	150	100	—	600	500	—	—
Kalutara ..	406	488	1,063	731	757	—	—	—	—	—	—	1,200	1,200	1,200
Gampaha ..	208	181	602	458	525	—	—	—	—	—	—	—	—	—
Ratnapura ..	165	269	200	283	217	—	100	200	830	500	—	—	—	—
	1,299	1,455	2.719	2,129	1,659	—	100	350	930	500	600	1,700	1,200	1,200
North Western Division														
Kurunegala ..	375	709	1,603	747	761	—	—	—	—	265	—	—	—	—
Hakwatuna Oya ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nikaweratiya ..	—	447	104	944	1,260	324	—	—	—	—	—	—	—	—
Rajangana ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Puttalam ..	557	498	585	515	295	200	210	349	300	605	—	600	600	700
	932	1.654	2,292	2,206	2,316	524	210	349	300	870	—	600	600	700
North Central Division														
Anuradhapura ..	58	763	953	1,038	1,101	110	168	75	—	145	—	—	—	—
Mahakanadarawa	745	316	1,052	1,147	1,368	165	150	100	—	—	—	—	—	—
Padaviya ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	803	1,079	2,005	2,185	2,469	275	318	175	—	145	—	—	—	—
Northern Division														
Vavuniya ..	242	512	377	60	—	—	—	—	—	—	—	—	—	—
Mannar ..	127	126	250	250	—	418	380	—	100	275	—	—	—	—
Killinochchi ..	55	270	230	140	—	1,366	1,434	1,709	1,401	1,227	—	—	—	100
Oddusuddan ..	100	—	—	—	60	820	1,134	—	100	100	—	—	—	—
Malwatu Oya ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	524	908	857	450	60	2,604	2,948	1,709	1,601	1,602	—	—	—	100
Trincomalee Division														
Trincomalee ..	259	193	367	276	—	94	188	100	—	300	—	—	—	—
Allai ..	—	145	—	—	—	500	—	—	—	—	—	—	—	—
Kantalai ..	60	—	40	35	135	300	300	500	200	—	—	—	—	—
	319	338	407	311	135	894	488	600	200	300	—	—	—	—
North Eastern Division														
Polonnaruwa ..	375	428	566	200	326	150	—	50	100	360	—	—	—	—
Minneriya ..	—	—	—	196	75	—	749	—	—	—	—	—	—	—
Kaudulla ..	—	—	—	130	—	177	100	—	—	—	—	—	—	—
Pimburettewa ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	375	428	566	526	401	327	849	50	100	360	—	—	—	—
Eastern Division														
Chenkaladi ..	100	200	125	290	231	410	2,160	3,044	1,315	900	—	—	—	—
Kalmunai ..	—	—	495	500	200	—	—	—	2,200	3,620	—	—	—	—

UTION OF ACREAGES BY S.D.D.

	Lift Irrigation Works Acres					*Major Works Acres*					*Grand Total*					*Area now under Maintenance in Major Schemes*
	Years					*Years*					*Years*					
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
	—	—	—	—	—	—	—	—	—	—	1,120	1,017	1,004	757	160	9,216
	—	—	—	—	—	—	—	—	—	—	406	1,688	2,263	1,931	757	12,613
	—	—	—	—	—	—	—	—	—	—	208	181	602	458	525	7,060
	—	—	—	—	—	—	—	—	—	—	165	369	400	1,113	717	1,717
	—	—	—	—	—	—	—	—	—	—	1,899	3,255	4,269	4,259	2,159	30,606
	200	—	—	—	—	—	—	—	—	—	575	709	1,603	747	1,026	8,098
	200	200	200	300	200	500	850	—	—	—	700	1,050	200	300	200	—
	—	200	200	250	—	—	—	—	—	—	324	647	304	1,194	1,260	12,307
	200	200	200	900	1,000	3,000	3,000	3,000	2,350	—	3,200	3,200	3,200	3,250	1,000	—
00	—	—	—	—	—	—	—	—	—	—	757	1,308	1,534	1,515	1,200	4,259
00	600	600	600	1,450	1,200	3,500	3,850	3,000	2,350	—	5,556	6,914	6,841	7,006	4,686	24,664
	—	—	100	100	150	—	—	—	—	—	168	931	1,128	1,138	1,396	27,218
	200	200	200	150	—	724	1,000	1,000	—	—	1,834	1,666	2,352	1,297	1,368	20,047
	—	100	100	150	150	1,700	1,100	—	1,000	1,000	1,700	1,200	100	1,150	1,150	—
	200	300	400	400	300	2,424	2,100	1,000	1,000	1,000	3,702	3,797	3,580	3,585	3,914	47,265
	—	—	—	—	—	—	—	—	—	—	242	512	377	60	—	8,928
	—	—	—	—	—	—	—	—	—	—	545	506	250	350	275	20,485
0	—	150	150	—	—	—	—	—	—	—	1,421	1,854	2,089	1,641	1,327	21,074
	200	200	200	400	500	3,000	3,785	3,100	3,000	900	4,120	5,119	3,300	3,500	1,560	5,177
	—	—	—	—	—	—	—	—	—	1,000	—	—	—	—	1,000	—
0	200	350	350	400	500	3,000	3,785	3,100	3,000	1,900	6,328	7,991	6,016	5,551	4,162	55,664
	—	150	150	200	300	500	500	2,000	1,500	1,000	853	1,031	2,617	1,976	1,600	3,447
	—	—	—	—	—	—	—	—	—	—	500	145	—	—	—	11,018
	—	—	—	—	—	—	—	—	—	—	360	300	540	235	135	20,558
	—	150	150	200	300	500	500	2,000	1,500	1,000	1,713	1,476	3,157	2,211	1,735	35,023
	200	150	100	100	—	—	—	—	—	—	725	578	716	400	686	18,200
	200	400	350	—	—	—	300	402	—	—	200	6,449	752	196	75	25,303
	—	100	150	—	—	3,014	700	—	—	—	3,191	900	150	130	—	3,049
	—	—	—	—	—	—	—	1,000	1,500	1,500	—	—	1,000	1,500	1,500	—
	400	650	600	100	—	3,014	1,000	1,402	1,500	1,500	4,116	2,927	2,618	2,226	2,261	—
	—	—	—	—	—	—	—	—	—	—	510	2,360	3,169	1,605	1,131	23,934

	—	525	—	—	—	—	—	—	—	—	—	—	—	—	—
	100	525	620	790	431	410	2,160	3,044	3,515	3,570	—	—	—	—	—
Central Division															
Kandy	295	339	285	63	—	—	74	—	—	—	—	—	—	—	—
Matale ..	197	333	607	599	637	900	—	100	1,325	325	—	—	—	—	—
Hasalaka ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Minipe ..	—	—	148	130	198	—	—	—	—	—	—	—	—	—	—
Nuwara Eliya ..	173	292	411	393	—	78	100	162	—	300	—	—	—	—	—
	665	964	1,451	1,185	835	978	174	262	1,325	625	—	—	—	—	—
Uva Division															
Monaragala ..	33	—	105	240	280	328	628	220	581	74	—	—	—	—	—
Badulla ..	46	260	480	430	400	150	504	750	500	150	—	—	—	—	—
Mahiyangana ..	—	261	70	70	50	150	632	131	—	—	—	—	—	—	—
	79	521	655	740	730	628	1,764	1,101	1,081	224	—	—	—	—	—
Southern Division															
Tissa ..	50	30	118	140	160	425	—	—	—	—					
Hambantota ..	75	170	94	467	403	147	—	—	—	—	—	—	200	100	100
Galle ..	255	683	1,422	1,376	492	—	—	—	—	—	2,400	2,900	3,800	1,700	750
Muruthawala ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	380	883	1,634	1,983	1,055	572	—	—	—	—	2,400	2,900	4,000	1,800	850
Grand Total ..	5,476	8,755	13,206	12,505	10,091	7,212	9,011	7,640	9,052	8,196	3,000	5,200	5,800	3,800	1,250
	Total Village Works = 50,033					Total Medium Scale Works = 41,111					Total Drainage Recl. Works = 19,050				

500	500	500	1,000	1,000	—	—	—	—	—	500	825	500	1,000	1,000	54,000
500	500	500	1,000	1,000	—	—	—	—	—	1,010	3,185	4,164	5,305	5,001	—
—	—	—	—	—	—	—	—	—	—	295	413	285	63	—	1,424
—	—	—	—	—	—	—	—	—	—	1,097	333	707	1,924	962	2,916
200	200	200	100	100	1,552	1.329	1,500	1,500	—	1,752	1.529	1,700	1,600	100	—
—	—	—	—	—	—	—	—	—	—	—	—	148	130	198	6,098
—	—	—	—	—	—	—	—	—	—	251	392	573	393	300	1,990
200	200	200	100	100	1,552	1,329	1,500	1,500	—	3,395	2,667	3,413	4,110	1,560	—
—	—	—	—	—	—	—	—	—	—	361	628	325	821	354	6 234
—	—	—	—	—	—	—	—	—	—	196	764	1;230	930	550	5,078
100	100	100	—	—	—	—	1,500	1,500	1,000	250	993	1,801	1,570	1,050	2,384
100	100	100	—	—	—	—	1,500	1,500	1,000	807	2,385	3,356	3,321	1,954	—
—	—	—	—	—	—	—	—	—	—	475	30	118	140	160	9,685
—	—	—	—	—	—	—	—	—	—	222	170	294	567	503	25,881
—	—	—	—	—	—	—	—	—	—	2,655	3,583	5,222	3,076	1,242	22,340
—	—	—	—	—	—	—	—	2,000	4,000	—	—	—	2,000	4,000	—
—	—	—	—	—	—	—	—	2,000	4,000	3,352	3,783	5,634	5 783	5,905	—
2,200	2 850	2,900	3,650	3,400	13,990	12,564	13,502	14,350	10,400	31,878	38,380	43,048	43,357	33,337	411 502
Total lif Irrigation Works = 15,000					Total Major Works = 64,806					Total = 190,000					

APPENDIX B

5-YEAR PROGRAMME OF DEVELOPMENT—PROPOSED DISTRIBUTION OF TECHNICAL STAFF

Office	*Technical Assistants*					*Draughtsmen*					*Irrigation Engineers*				
	1st Year	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*	*1st Year*	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*	*1st Year*	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*
Western Divisional Office ..	—	—	—	—	—	6	8	8	8	8	1	1	1	1	1
Colombo S. D. ..	10	10	10	9	7	3	3	3	3	3	2	2	2	2	2
Kalutara S. D. ..	7	11	11	11	7	2	3	4	3	2	1	1	1	1	1
Gampaha S. D. ..	6	6	6	6	6	2	2	2	2	2	1	1	1	1	1
Ratnapura S. D. ..	6	6	6	6	6	1	1	2	2	1	1	1	1	1	1
	29	33	33	32	26	14	17	19	18	16	6	6	6	6	6
North Western Division ..	—	—	—	—	—	12	12	12	12	10	4	4	4	4	4
Kurunegala S. D. ..	8	10	11	9	9	3	3	3	2	2	1	2	2	1	1
Hakwatuna Oya S. D. ..	6	5	4	3	3	2	2	2	1	1	1	1	1	—	—
Nikaweratiya S. D. ..	7	7	7	7	7	1	1	2	2	2	1	1	1	2	2
Rajangana S. D. ..	20	20	20	16	9	6	6	5	5	4	4	4	4	3	2
Puttalam S. D. ..	9	10	10	10	10	2	2	2	2	2	1	1	1	1	1
	50	52	52	45	38	26	26	26	24	21	12	13	13	11	10
North Central Division ..	—	—	—	—	—	9	9	9	9	9	3	3	3	2	2
Anuradhapura S. D. ..	9	9	10	10	9	2	2	2	2	2	2	2	2	2	2
Mahakanadarawa S. D. ..	10	11	11	9	8	3	3	3	2	2	3	3	2	2	2
Padaviya S. D. ..	14	12	11	8	6	5	5	4	3	2	2	2	2	2	1
	33	32	32	27	23	19	19	18	16	15	10	10	9	8	7
Northern Division ..	—	—	—	—	—	12	12	12	12	10	4	4	4	4	4
Vavuniya S. D. ..	6	7	6	6	6	1	1	1	1	1	1	1	1	1	1
Mannar S. D. ..	7	7	6	7	6	1	1	1	1	1	1	1	1	1	1
Killinochchi S. D. ..	10	10	11	10	10	2	2	2	2	2	2	2	2	2	2
Oddusuddan S. D. ..	22	22	19	18	13	6	5	4	4	4	4	4	4	3	2
Malwatu Oya S. D. ..	—	10	25	25	30	—	5	6	7	7	—	3	5	7	7
	45	56	67	66	65	22	26	26	27	25	12	15	17	18	17
Trincomalee Division ..	—	—	—	—	—	6	6	9	7	6	1	2	2	1	1
Trincoamlee S. D. ..	9	12	12	12	10	3	3	4	4	3	1	2	2	2	2
Allai S. D. ..	6	5	4	4	4	2	2	1	1	1	1	1	1	1	1
Kantalai S. D. ..	6	5	6	5	5	2	2	2	1	1	1	1	1	1	1
	21	22	22	21	19	13	13	16	13	11	4	6	6	5	5

APPENDIX B—(contd.)

Office	*Technical Assistants*					*Draughtsmen*					*Irrigation Engineers*				
	1st Year	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*	*1st Year*	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*	*1st Year*	*2nd Year*	*3rd Year*	*4th Year*	*5t Ye*
North Eastern Division ..	—	—	—	—	—	9	9	8	8	8	2	2	2	2	2
Polonnaruwa S. D. ..	8	7	8	7	8	2	2	2	2	2	1	1	1	1	1
Minneriya S. D. ..	9	10	9	6	6	2	2	2	1	1	1	1	1	1	1
Kaudulla S. D. ..	13	10	6	6	6	5	4	3	2	2	3	2	1	1	1
Pimburuthawa S. D. ..	7	12	10	9	5	3	3	4	3	2	2	3	3	2	2
	37	39	33	28	25	21	20	19	16	15	9	9	8	7	7
Eastern Division ..	—	—	—	—	—	6	8	8	8	8	1	2	2	2	2
Chenkaladi S. D. ..	11	11	11	10	9	3	3	3	2	2	2	2	2	1	1
Kalmunai S. D. ..	5	6	10	10	10	1	2	2	2	2	1	1	2	2	2
Amparai S. D. ..	9	9	10	10	10	2	2	2	2	2	1	1	1	1	1
	25	26	31	30	29	12	15	15	14	14	5	6	7	6	6
Central Division ..	—	—	—	—	—	8	8	8	8	8	2	2	2	2	2
Kandy S. D. ..	7	7	5	5	5	2	2	1	1	1	1	1	1	1	1
Matale S. D. ..	9	7	6	6	6	2	2	1	1	1	1	1	1	1	1
Hasalaka S. D. ..	14	14	13	10	8	4	4	4	3	2	3	3	3	3	2
Minipe S. D. ..	6	6	6	6	6	1	1	1	1	1	1	1	1	1	1
Nuwara Eliya S. D. ..	6	6	6	6	6	1	1	1	1	1	1	1	1	1	1
	42	40	36	33	31	18	18	16	15	14	9	9	9	9	8
Uva Division ..	—	—	—	—	—	9	9	9	9	8	1	2	2	2	2
Moneragala S. D. ..	8	8	8	9	8	2	2	2	2	2	1	1	1	1	1
Badulla S. D. ..	7	9	10	10	7	2	2	2	2	2	1	1	1	1	1
Mahiyangane S. D. ..	10	18	17	12	8	5	5	5	4	3	2	3	4	3	2
	25	35	35	31	23	18	18	18	17	15	5	7	8	7	6
Southern Division ..	—	—	—	—	—	8	8	9	9	9	2	2	3	2	1
Tissa S. D. ..	7	6	6	6	6	2	1	1	1	1	1	1	1	1	1
Hambantota S. D. ..	7	7	8	8	8	2	2	2	2	2	1	1	1	1	1
Galle S. D. ..	10	10	11	10	9	3	3	3	3	2	2	3	3	3	1
Muruthawela S. D. ..	11	16	16	13	10	4	5	5	5	4	2	4	4	4	3
	35	39	41	37	33	19	19	20	20	18	8	11	12	11	7
Total for Territorial Work..	342	374	382	350	312	182	191	193	180	164	80	92	95	88	79

APPENDIX B—(contd.)

Office	*Technical Assistants*					*Draughtsmen*					*Irrigation Engineers*				
	1st Year	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*	*1st Year*	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*	*1st Year*	*2nd Year*	*3rd Year*	*4th Year*	*5th Year*
Head Office															
Development ..	—	—	—	—	—	10	10	10	10	10	3	3	3	3	3
Blocking Out Major Scheme	—	—	—	—	—	12	12	12	12	12					
Designs ..	—	—	—	—	—	15	15	15	15	15	13	17	23	30	30
Planning ..	—	—	—	—	—	10	10	10	10	10					
Territoiral ..	—	—	—	—	—	22	22	22	22	22	4	4	4	4	4
Plan Branch ..	—	—	—	—	—	4	4	4	4	4	—	—	—	—	—
Progress Statistics Hydro-data ..	2	2	2	2	2	8	8	8	8	8	2	2	2	2	2
Lift Irrigation ..	4	4	4	4	4	7	8	8	10	10	3	3	4	4	4
Drainage and Reclamation	2	2	2	2	2	8	8	10	10	10	2	3	3	2	2
Major Scheme Investigation	20	20	20	20	20	8	8	8	8	8	—	—	—	—	—
Village Works Mech. Unit	6	6	6	6	6	—	—	—	—	—	—	—	—	—	—
Laboratory ..	8	8	8	8	8	6	6	6	6	6	8	8	8	8	8
Mahaweli Investigation ..	18	18	15	15	12	16	16	16	16	16	18	18	18	11	10
Contracts ..	—	—	—	—	—	—	—	—	—	—	1	1	1	1	1
Ratmalana Mech. Branch..	8	8	8	8	8	3	3	3	3	3	—	—	—	—	—
Training Class ..	2	2	1	1	1	2	2	1	1	1	4	4	2	2	2
Internal Audit ..	2	2	2	2	2	—	—	—	—	—	1	1	1	1	1
	72	72	68	68	65	131	132	133	135	135	59	64	69	68	67
Add-territorial requirements	342	374	382	350	312	182	191	193	180	164	80	92	95	88	79
Total ..	414	446	450	418	377	313	323	326	315	299	139	156	164	156	146
On Study leave Scholarship training &c. ..	27	25	20	20	20	—	—	—	—	—	15	15	15	15	15
On Secondment to other departments ..	30	30	30	30	30	—	—	—	—	—	4	4	4	4	4
Total ..	471	501	500	468	427	313	323	326	315	299	158	175	183	175	165
Add for New Schemes ..	—	—	25	62	108	—	—	4	15	36	—	—	7	14	29
Total ..	471	501	525	530	535	313	323	330	330	335	158	175	190	189	194
Existing Cadre ..	464					307					130				
Strength ..	444					307					130				

SECTION II

Lands, Surveys and Forests

CHAPTER I

LAND POLICY

Historical Introduction

1. The Crown Lands Encroachment Ordinance which was passed in 1840 embodied the principle that all undeveloped land was Crown property. As a result of this Ordinance, all village pasture and chena lands and other lands which under normal circumstances would have been reserved for expansion of villages became Crown property. With the introduction of crops like coffee, tea and rubber Crown land was disposed of in large units to the highest bidders which in fact means that this system was weighted in favour of the investor whether European or Ceylonese who had ready capital to the detriment of peasants. About 1,500,000 acres of land were thus disposed in the 19th century. The first attempt at Government participation in land development was the restoration of Kalawewa in 1890 and the experiment in Government assisted colonization under the tank. The scheme, however, failed through friction between colonists and purana villagers.

2. As a result of large scale sale and lease of Crown land in the hill country and wet zone, very little land was left over for the natural increase of local population. The peasantry in this area also lost land through indebtedness and fragmentation. A Land Commission was appointed in 1929 and it recommended that the preservation of the peasantry should be the main object of future land policy. The Land Development Ordinance of 1935 was enacted with the object of preserving the interests of the peasantry as its primary purpose. A new form of tenure under this Ordinance was designed to give land as a lease in perpetuity to selected allottees and to their properly nominated successors subject to conditions. These were that the land should be properly used and that it was not to be disposed of without permission and that it was passed on the death of the holder to the nominated successor. The last condition was imposed to prevent fragmentation due to inheritance by a large number of heirs. After 1939 a scheme of aided land colonization under larger reservoirs, restored in the dry zone areas, was undertaken. This scheme provided for the clearing of the land at Government expense, restoration of irrigation works and provision of irrigation facilities, type plan cottages at Government expense and payment of subsistence allowance to colonists until they get their first harvest. Planting materials were supplied free and assistance was given for the stumping and ridging of the paddy allotment. Loans were also given for cultivation and buffaloes. The unit of alienation was 5 acres paddy land and 3 acres highland. The first attempt at colonization under the assisted scheme was not much of a success mainly due to the incidence of Malaria. With the eradication of Malaria during the War years by the widespread application of D. D. T. adverse conditions in the dry zone changed making these areas attractive for settlement. The growing unemployment population

pressures and landlessness in the Wet Zone led to much demand for land under these new colonization schemes and large scale encroachments.

Alienation of land up to about 1965 falls under four main categories :—

(*a*) MAJOR COLONIZATION SCHEMES

These schemes were set up in areas taken for development on a large scale after meeting the demands of the villages in the locality. Peasant families were shifted from the heavily congested wet zone and mid-country areas. The unit of alienation at the commencement was 5 acres paddy land and 3 acres highland and this was subsequently reduced to 3 acres paddy land and 2 acres highland as it was felt that the unit of 5 acres of paddy land was too much to be intensively cultivated by the labour available from one family. As the demand for land in major colonization schemes grew, the unit was further reduced to 2 acres paddy land 1 acre highland. About 50,000 families have been settled under major colonization schemes since 1935. The extent alienated under major colonization schemes was 69,900 acres of paddy up to the end of 1955 and about 60,000 acres between 1955 and 1964. An additional extent of 40,000 acres was alienated under the Gal Oya project.

(*b*) VILLAGE EXPANSION SCHEMES

Land was alienated under these schemes to landless peasants and unemployed in existing villages. Most of the land alienated under these schemes were highlands. A certain amount of paddy land was also alienated in small units in minor irrigation schemes restored in these villages. A total of about 308,000 acres were alienated up to end of 1955 and 225,000 acres between 1955 and 1964.

(*c*) HIGHLAND COLONIZATION SCHEMES

As the extent opened up under major colonization schemes was not sufficient to relieve pressures of population and unemployment of the wet zone areas, it was decided to take up undeveloped areas in the Galle, Matara, Kalutara and Ratnapura districts under commercial crops like tea and rubber. Highlands in the Puttalam, Vavuniya, Jaffna, Moneragala and Kurunegala districts were also taken up for development by the peasantry. Schemes of assistance were drawn up for the cultivation of tea, rubber and coconuts. Factories for processing the produce were put up at Government expense. About 28,000 acres have been alienated since 1955 under highland and colonization schemes for the cultivation of tea, rubber and coconuts.

(*d*) MIDDLE-CLASS ALIENATION

The Land Development Ordinance besides providing for lease of land under restricted tenure to the peasants also provides for the development of land by Middle-Class Ceylonese. For the purpose of definition, the upper income limit of a middle-class Ceylonese has been fixed earlier at Rs. 12,000 per annum, and has now been increased to Rs. 24,000. No assistance is extended by the Government except in the form of a loan if the land is partially developed by the allottee at his own expense. The total alienations under this scheme up to end of 1955 was 74,500 acres and after 1955—66,000 acres.

The Appendices to this Chapter give statistics of land alienated under these categories and improvement works.

LAND ALIENATION UP TO 1964

Year		Village Expansion		Acquired Lands		Colonization			Highland Colonization						M. C. C.		Total	
		Lot No.	Acres	Lot No.	Acres	Lot No.	P/L Acres	H/L Acres	Tea Lot No.	Tea Acres	Rubber Lot No.	Rubber Acres	Coconut Lot No.	Coconut Acres	Lot No.	Acres	Lot No.	Acres
1939–47	Lot No.	55,761		N. A.		2,007									3,295		61,063	
	Acres		80,203		10,958		9,345	5,607								35,185		141,298
1948	Lot No.	19,046				578									571		20,195	
	Acres		27,306		1,126		2,530	1,518								5,868		38,348
1949	Lot No.	16,161				2,683									103		18,947	
	Acres		27,836		3,258		13,030	7,816								1,354		53,294
1950	Lot No.	22,860				2,110									253		25,223	
	Acres		39,485		5,126		10,160	6,093								1,942		62,806
1951	Lot No.	18,804				918									377		20,099	
	Acres		36,614		1,294		4,565	2,741								5,369		50,583
1952	Lot No.	19,441				1,415									216		21,072	
	Acres		32,573		635		5,880	3,529								1,959		44,576
1953	Lot No.	12,237				2,722									49		15,008	
	Acres		18,137		1,979		7,863	5,244								922		34,145
1954	Lot No.	1[illegible]18				2,834									584		21,236	
	Acres		21,607		1,204		7,653	5,100								11,560		47,124
1955	Lot No.	18,897		2,245		2,889							95		538		24,664	
	Acres		26,500		2,228		7,983	4,812						500		8,860		50,883
1956	Lot No.	20,587		1,636		3,262			180		227		545		1,013		27,450	
	Acres		34,510		728		9,667	4,348		430		680		2,750		13,082		66,195
1957	Lot No.	28,351		2,199		3,695			440		83		492		1,946		37,206	
	Acres		37,525		1,378		10,937	5,326		1,008		250		2,335		6,471		65,230

LAND ALIENATION UP TO 1964—(contd.)

Year		Village Expansion		Acquired Lands		Colonization			Highland Colonization						M. C. C.		Total	
									Tea		Rubber		Coconut					
		Lot No.	Acres	Lot No.	Acres	Lot No.	P/L Acres	H/L Acres	Lot No.	Acres	Lot No.	Acres	Lot No.	Acres	Lot No.	Acres	Lot No.	Acres
1958	Lot No. Acres	18,126	26,654	4,677	2,329	5,423	14,393	8,778	50	113			300	1,500	169	3,912	28,745	57,679
1959	Lot No. Acres	22,247	27,612	4,380	1,973	2,540	5,791	2,775	1,204	2,710	188	564	582	2,920	1,797	18,350	32,938	62,695
1960	Lot No. Acres	12,955	15,714	3,693	1,631	1,732	5,121	3,010	148	370	260	780	158	790	690	5,210	19,636	32,626
1961	Lot No. Acres	14,971	20,445	5,351	2,268	620	1,082	821	198	348	Coffee		530	2,390	298	2,185	21,968	29,539
1962	Lot No. Acres	17,947	23,889	4,761	2,230	2,223	6,234	3,007	238	562			371	1,850	534	6,143	26,074	43,915
1963	Lot No. Acres	18,186	27,568	5,862	2,177	2,066	5,196	3,077	224	535	45	112	941	4,323	930	10,395	28,254	53,383
1964	Lot No. Acres	17,185	22,502	2,273	1,754	7,761	17,686	11,913	590	1,325			606	2,865	535	3,183	28,950	61,22
Total	Lot No. Acres	371,580	546,680	37,077	44,276	47,478	145,116	85,515	3,272	7,401	803	2,386	4,620	22,223	13,898	141,950	478,728	995,547
*Adjust	Totals Acres	379,370	564,836–2–0	41,610	28,270–2–30	45,350	140,848	82,390							8,974	111,173–3–26		
Grants	Lot No. Acres	3,632	7,587–3–17												2,225	31,204–2–30		

*Allowed for cancellations, re-alienations, sub-divisions of allotments, grants and other adjustments.

To	*T. P. houses subsidy*	*Dept. or contract*	*Wells*	*Roads*
1947	3,251	2,096	531	26 *M*
1948	769	732	125	—
1949	792	495	226	—
1950	396	397	175	—
1951	854	713	175	—
1952	1,838	1,233	832	—
1953	11,517	1,487	1,596	—
1954	10,813	5,132	1,573	—
1955	6,754	140	2,983	85
1956	8,364	290	2,938	45
1957	6,371	147	2,857	83
1958	5,188	51	2,249	67
1959	4,404	—	2,080	69
1960	3,933	10	1,489	76
1961	4,023	—	1,564	135
1962	2,980	37	908	125
1963	2,441	99	943	143
1948–63	71,437	10,963	22,713	828

CHAPTER II

CHANGES IN LAND POLICY

1. In 1955 a Commission was appointed to report on land policy and generally review the Land Development Ordinance of 1935. The main recommendations of the Commission are :—

(1) Setting up of an organization for the planning of land use ;

(2) the division into categories of persons entitled to alienation of land under the Land Development Ordinance ;

(3) The change in the system of tenure—

(i) Stage 1—Extending as recommended for a period of 3 years during which an allottee will be subject to intense supervision and pay nominal rent. For further details you are referred to paragraphs 227 to 229 in annexure 'A'. No disposition will be possible during this stage.

(ii) Stage 2—The allottee will obtain greater security of tenure for his land. During this stage the allottee if he so wishes can opt to pay in instalments the capital expenditure by the Government on his allotment. Further details can be found in paragraphs 230 to 234 in annexure 'A'.

(iii) Stage 3—The allottee who has completed all arrears of payment will be entitled to a grant which he can dispose of at will subject only to conditions about fragmentation.

2. The Commission felt that as a result of restriction on the transfer of land and succession, the peasants did not have the satisfaction that they really owned the land and as a result most of the lands alienated under the Land Development Ordinance to peasants have not been properly developed, and that a change in the system of tenure will give them the necessary incentives. The Commission proposed that the peasant allottees should be given ownership of the land after they meet part of the cost incurred by the Government. The difficulty in implementing the recommendation about ownership of land without restricting the freedom of disposing is the fear that there will be large scale change in ownership of land from the peasant class to the richer classes. The peasantry whether having private land or allottees holding leases of Crown land are chronically indebted and any liberalization of the conditions of the tenure can have adverse effects with a general transfer of land from their hand to the hands of money lenders and richer classes. A scheme is, however, being drawn up to allow a less restricted system of tenure which will have at the same time safeguards against large scale transfer of peasant owned lands to the richer classes. As regards recovery of Government expenditure on the

development of land, a scheme is under consideration for the recovery of expenditure on provision of irrigation facilities, assistance for development of land and for the construction of cottages. The cost of the headworks of irrigation facilities and other amenities like roads, schools, hospitals, etc., will not be recovered. These are facilities which have to be provided by Government to its citizens wherever they are, and there is no justification for charging such expenditure from the allottees. Amendments to the Land Development Ordinance to implement these recommendations will be taken up in 1966. The neglect of highlands in colonization schemes in the dry zone has been one of the major drawbacks. It is proposed to remedy this by provision of lift irrigation facilities so that these highlands will get developed and contribute to the national income.

CHAPTER III

MAJOR COLONIZATION SCHEMES

1. Reference has been made earlier to the disposal of the Crown land in the 19th century by sale or perpetual lease on a large scale to private investors to the detriment of the peasants. With the mounting criticism of the plight of the peasant in the early part of the 20th century this system of disposal of Crown land by outright sale was first modified in favour of selected villagers who possessed less than a quarter acre of land to whom the Revenue Officer was authorized to sell land suitable for paddy fields or gardens without competition. This was extended in the nineteen twenties to include village applicants who did not own sufficient land for the support of themselves and their families. The Revenue Officer was further authorized in disposing of such lands to restrict competition to permanent inhabitants of the village. The outright sale of land as another method of alienation of Crown land was stopped in 1916 and a system of leases was tried out. From 1920 the scheme was modified to one of preferential alienation of Crown land to selected Middle Class Ceylonese and to peasants. Village lands were mapped out pending the Land Development Ordinance to preserve the interests of the peasant.

2. The first venture in assisted colonization was in 1890 in the Kalawewa Scheme. The assistance took the form of loans but due to various reasons the scheme was a failure. Similar schemes started under other reservoirs were all failures. Aided colonization was first mooted in the year 1932 when owing to the economic depression and wide spread unemployment it was considered desirable to review and improve the system of alienation of Crown land so as to accelerate the settlement of the landless. Subsidised colonization has been tried out till then and a few were in existence, but the subsidies had taken the form of loans, the recovery of which had become hopeless. Till the end of 1932 the whole process of the development of uncleared land was in the hands of the allottee who might in some cases begin the assistance with a loan to meet his expense but ultimately bore the whole cost himself. Development under this scheme being very slow in view of the abject poverty of the peasant and the incidence of Malaria towards the end of 1932, Government for the first time took upon itself a share of the responsibility. In that year the accepted plan of development for the Minneriya colonization scheme provided for clearing at Government expense of the entire extent of land earmarked for peasants and for the establishment and maintenance, without cost to the settlers, of measures for the prevention of Malaria including the establishment and staffing of a hospital. Roads and channels were to be constructed at Government expense and agricultural advice given free. Seed paddy would have to be purchased by the colonists and no cash subsidies were given.

3. Even under this scheme of Government assistance which commenced in 1932 the development was slow. Seven years later the Government considered

that a change of policy was necessary because the unemployment problem had increased and the necessity for more extensive production of food stuffs had grown more acute while colonization had been slow and expensive in the matter of human lives. The important points in the new policy adopted were as follows :—

(1) Each colonist should be given a unit of land sufficient to make him economically independent.

(2) Cultivation of high and low land should follow a settled programme.

(3) Each colonist should be provided with a homestead fit for human habitation.

(4) Arrangements should be made for the marketing of the produce.

(5) Clearing of the land should be the responsibility of the Government.

(6) Each colonist should be given a subsistence allowance for 6 months till he obtained his first harvest.

(7) Assistance was given for ridging and stumping.

(8) Roads, water supply and the construction and maintenance of channels was the responsibility of Government.

All colonization schemes since 1939 have been based on the policy indicated above. The unit of alienation was 5 acres paddy and 3 acres highland. In 1953 the unit of alienation was changed from 5 acres irrigable land and 3 acres highland to 3 acres of irrigable land and 2 acres highland. This reduction was made as it was found from experience that the original unit was in excess of what an average colonist was capable of cultivating conveniently by his own labour. With the increase in unemployment and landlessness this reduction also enabled a larger number of colonists to be settled.

4. The policy prevailing up to 1956 of bringing the colonist to a settlement where the full irrigation facilities had been provided, the land had been developed and the house constructed, was changed in that year. The policy of bringing settlers to a fully developed land did not provide them with a sense of participation and therefore did not breed the correct attitudes among the allottees. Therefore, in that year a scheme of settlement, before irrigation facilities were provided and the land developed, was adopted. Under this policy the settlers were brought 2 or 3 years before irrigation facilities were expected to be available. The settlers were then given assistance in the form of cash subsidies for the clearing of their paddy as well as highland areas. They cultivated their cleared lands under chena crops thus bringing the land into production earlier. The settlers were then given work in the construction of channels and roads till irrigation facilities were provided. The delay in provision of irrigation facilities by Government caused a certain amount of hardship to the colonist. 1957 floods and the necessity to repair 1,400 breached tanks held up this new scheme. The provision of drinking water also became an expensive item. Under these circumstances the policy has been revised to one of settling colonists

one year in advance of irrigation facilities. The unit of alienation has also been reduced to 2 acres paddy land and one acre of highland partly with a view to meeting the increasing unemployment problem and partly to reducing the cost to Government per settler. The policy of departmental construction of houses was also changed and a subsidy of Rs. 1,000 per type plan house was paid to the colonist with a view to further reducing the expenditure on the colonist.

5. Under the present scheme of alienation the colonist is brought to temporary camps constructed by the Land Development Department in June and July of each year. Paddy allotments are given in blocks of 30 acres per 15 colonists to be cleared in time for chena cultivation in Maha of the same year. They are paid a subsidy of Rs. 100 per acre for jungle clearing. The cost of the temporary buildings which are put up at the rate of one building per unit of 40 colonists is Rs. 2,350. The colonists are given a grant of Rs. 80 by the Land Commissioner for the construction of temporary huts into which he can move with his family and a subsidy of Rs. 1,000 for the construction of a type-plan cottage by the Land Development Department. A subsidy of Rs. 100 is also given for the clearing of thick highland. Civic facilities consisting of schools, dispensaries, co-operative stores, sub-post offices and quarters for Land Commissioner's staff are given in Community Centres, each Centre serving roughly a group of 200 colonists. The cost of providing the civic facilities works out roughly to Rs. 658 per colonist.

6. The scheme of settling colonists prevailing at present has certain draw-backs. The colonist is separated from his family in the early stages of his settlement which is a disadvantage. Their highland is not blocked out and given to them until at a later stage so that he cannot bring his family to live with him till this is done. It is proposed to remedy this by having the highland cleared by labour of the Director of Land Development so that when the colonist arrives in the scheme he would receive already cleared land on which he can immediately construct temporary huts on the grant of Rs. 80, given him by the Land Commissioner and settle down with his family. Wadiyas will be put up for the Land Development labour to clear the highland and for the construction of the general buildings. Colonists will be brought into wadiyas in late August and will be accommodated there for a period of two to three weeks till they can put up their temporary huts. As wadiya accommodation will be limited the colonists will have to be brought in two batches, one in early August and one in the latter half of August. The colonist will immediately after construction of the temporary huts be able to move into their highland and also plant permanent crops like coconut and mangoes in the very first season. Immediately after they have planted their highland they will be organized into groups for the construction of their permanent huts on a shramadana basis. It is proposed to increase the subsidy for the type-plan house in colonization schemes to Rs. 1,200 per colonist without increasing the over-all assistance to a colonist to enable him to buy the necessary materials without having to finance a part

of the cost. His contribution will be only labour. The temporary camps which they vacated on moving into their individual temporary huts will thereafter be used as temporary general buildings for co-operative stores, etc. To compensate for the subsidy on clearing of paddy land which he now obtains in the first year, work will be provided for by the Land Development Department and the Irrigation Department on distributory channels and roads.

7. The policy of settling colonists in groups of 200 units was initiated at the time when the extent of highland allotments was 2 acres or more to enable the provision of civic amenities, schools, hospitals, post offices, co-operative stores, etc., within a reasonable distance. The main disadvantage of this scheme was that several small schools and dispensaries had to be built in the same colonization scheme with lesser facilities whereas if the highland allotments were concentrated in a smaller area much better amenities could have been provided at the same or lesser cost. Provision of water service and electricity at a later stage will also be facilitated by the construction of the residential buildings in a concentrated area. With the present policy of one acre highland it would be possible to site all these highland allotments within an area of three to four square miles so that the civic centre situated in the middle will not be more than 1½ to 2 miles distant for a colonist. It will then be possible to provide these facilities for groups of 600 colonists instead of 3 civic centres in groups of 200 units each as at present. The community centre for a group of 200 units at present provides for a school and two buildings, Head teachers' quarters, Assistant teachers' quarters at a cost of Rs. 78,175. The medical facilities for three groups of 200 units each cost Rs. 85,262 and three sites of co-operative stores buildings cost Rs. 24,037. Under the new proposal to concentrate all these buildings in one community centre to serve a group of 600 colonists a school for 1,200 pupils can be built. Similarly the medical facilities and commercial buildings can also be concentrated. As against the present cost of Rs. 396,337 for three civic centres servicing 200 colonists each, the cost of one community centre under the new scheme for 600 colonists will be Rs. 319,350.

8. One of the main criticisms of the colonization schemes has been the high cost of settlement and low productivity. In the calculation of the cost, the cost of providing the infra structures and the social service elements has been also taken into account. Cost of roads and communication are the responsibility of Government wherever the people are and there is no reason why these costs should be taken into account in considering the productivity of colonization schemes. Similarly, education, health services and other social amenities are the responsibility of the State to the people and must necessarily be excluded from the cost of colonization schemes. The cost of headworks of irrigation tanks in the case of private land is met by the Government and only a maintenance rate is charged. If the cost of these items are excluded the cost per colonist is reasonable. In any case in view of the abject poverty of the peasant no development is possible without Government assistance. Assistance on the

scale now prevailing is necessary for socio-economic reasons. The paddy areas in colonization schemes have contributed immensely to the increase in paddy production of the Island. During the period up to 1955, 69,900 acres of paddy lands had been brought under cultivation and for the period 1955 to 1963 an additional 60,000 acres have been brought under production. Another criticism of the colonization schemes is that the highlands in these schemes are not put to any productive use. The reason for this is that as most of the colonization schemes are in the dry zone, the highlands cannot be brought into productive use except with irrigation which has not been provided. The 5-Year programme provides for the provision of lift irrigation to about 10,000 acres in existing colonization schemes to be brought under subsidiary food crops. In the planning of future colonization schemes the highland lots will be so planned that they can be gravity irrigated from a high level channel to which water can be lifted by pumping to enable cultivation of subsidiary food crops, citrus and other crops.

9. The programme of alienation under major colonization schemes for the 5 year period 1965–1970 is dependent on the programme of the Irrigation Department. The programme of the Irrigation Department is being stepped up to provide for the irrigation of about 20,000 acres of new land under major irrigation schemes. The programme of colonization under major colonization schemes is as follows :—

Year	*No. of Allotments*	*Expenditure L. C's Vote Rs.*	*Expenditure D. L. D's Vote Rs.*
1966	7,000	6,000,000	29,295,000
1967	6,500	5,000,000	27,202,500
1968	7,500	4,500,000	31,387,500
1969	3,500	3,200,000	14,647,500
1970	4,000	3,500,000	16,740,000

The above figures are exclusive of the cost of land settlement in schemes under the administration of the River Valleys Development Board. Appendix 'A' gives the details of the schemes and their phasing and Appendix 'B' gives the details of expenditure on the L. C's Votes.

APPENDIX A

LAND COMMISSIONER'S DEPARTMENT

Allenation Programme for the Period 1966-1969 under Irrigation Schemes

District	Name of Scheme	No. of Allotments Available in				
		1966	1967	1968	1969	1970
Matale	Minipe Stage III	358†				
	Nabarala Wewa	50				
	Wewala Wewa			50	50	
	*Loluwela Dorawela Anicut Scheme		50	62	62	
	*Ma-Oya Wewa Scheme			50	50	
Nuwara Eliya	Keenawela Ela Anicut	50	58			
Vavuniya	Udayar Kaddukulam	192‡				
	Muthaiyankaddukulam	250§	1,000	750		
	Untharayankulam	—				
	Idaikaddukulam	84				
Jaffna	Vavunikulam	114				
	Tenniyankulam Aug. Scheme	60	130			
	Kariyalai Nagapaduwan		130	166		
	Ambalaperumalkulam	100	100	100		
	Visuvamadu Kulam	100	300			
	Murikandi Tank		50	50	63	
	Vannerikulam		115			
	Koddaikaddinakulam					
	*Perumkulam			50	50	
	Maruthankulam		34	50		
Mannar	Kurai Tank	100	63			
	*Kollam Velankulam			50	50	
Batticaloa	Henanegala Kandiya Tank	50	100	100	50	
	Kitulwewa Tank	150	150	100		
	Punani Anicut R. B. Scheme		250	250	275	
	Iddapola Anicut Scheme		100			
	Talpitiya Oya Anicut	50	75			
	Kaddumuruvu Kulam Scheme		50			
	Muthurankerni Tank		50	75	75	
	Kirimachchi Kulam	50	52			
	Weligahakandiya	12	57			
	Annasuddukattikulam Scheme	75	50			
	*Lahugala Aug. Scheme				50	
	*Lavanai Scheme		50	50		
	*Kunchan Kallukulam			100		
	*Meiyangoda Tank			32	50	
Trincomalee	Morawewa	500				
	Wan Ela Scheme	150	250	100		
	Neelapanikkan Kulam Scheme					
	*Per Aru Anicut Scheme				50	
Kurunegala	Rajangana L. B.	1,125	875	1,500	300	
	Hakwatuna Oya Scheme	355				

Alienation Programme for the period 1966–1969 under Irrigation Schemes—(*contd.*)

District	*Name of Scheme*	*No. of Allotments Availabale*				
		1966	*1967*	*1968*	*1969*	*1970*
Puttalam	Tabbowa Tank R. B. Channel Ext.			70		
	Pahariya	60				
	Pandiyamadu Tank		56			
	Tabbowa Tank Aug. Scheme				250	
Anuradhapura	Mahakanadarawa Tank	300				
	Padawiya	1,175				
	Mahakanadarawa Ext. Scheme	500	250	250		
	Ihalakalankutiya Tank	55				
	Tawalam Hammillewa	100				
	Parangiyawadiya Tank	25				
	Halpan Ela	25	25			
	*Kalawewa Aug. Scheme		1,000	1,250	250	
	*Wahalkada Project			750	250	
Badulla	Dambarawa					
	Ambawela Reservoir Scheme		250	250		
	Hambegamuwa Stage II	50	75	65		
	Mahaeliya Scheme	100				
	Batathuhena Anicut	25				
	Keragoda Tank	50				
	Thenagalkanda Wewa		60			
	Halmillapillawa Tank	75				
	Lunugala Yoda Ela	27				
	Ginnoruwa Tank	25				
	*Nagadipa Res. Project		250	750	750	
Polonnaruwa	Kaudulla Stage II	200	364			
	Giritale R. B. Channel Ext.	150				
	Kadawata Madu Tank		25	50	50	
Hambantota	Karawila Tank	77				
	Veheragoda Wewa Scheme	30				
	Katuwewa	33				
	*Muruthalawa Res. Project			500	750	
	*New Schemes.	7,057	6,494	7,620	3,475	
	†Total No. of Units to be alienated will however be 1,158–358	800				
	‡Total No. of Units to be alienated will however be 702–192	510				
	§Total No. of Units to be alienated will however be 1,650–250	1,400				
		9,767				
	Anuradhapura-Rajangana R.B. for Citrus Cultivation	100				
		9,867				

APPENDIX B

IRRIGATION (COLONIZATION) SCHEMES—EXPENDITURE

		1965–66	1966–67	1967–68	1968–69
3rd Year expenditure on 7,662 Colonists settled in 1963–64					
Seed paddy	60 00				
Planting Material	50 00				
Subsistence for 3 months	90 00				
	200 00	200×7662=1,532,400			
2nd Year expenditure on 1,911 Colonists settled in 1964–65					
Transport of family	100 00				
Subsistence for 3 months	90 00				
	190 00	190×1911=363,090			
1st Year expenditure on 9,867* allottees to be settled in 1965–66					
Transport of Colonists and families	125 00				
Temporary hut	80 00				
Subsistence for 4 months	120 00				
Implements	45 00				
	370 00	370×9867=3,650,790			
3rd Year expenditure on 1,911 Colonists settled in 1964–65					
Seed paddy	60 00				
Planting material	50 00				
Subsistence for 3 months	90 00				
	200 00		200×1911=382,200		

* Includes 100 units on Rajangana R. B. for Citrus cultivation.

IRRIGATION (COLONIZATION) SCHEMES—EXPEDITURE—(*contd.*)

		1965–66	*1966–67*	*1967–68*	*1968–69*
2nd Year expenditure on 9,867 allottees to be settled in 1965–66					
Subsistence for 2 months	60 00				
Seed paddy 4 bushels	60 00				
Planting materials	50 00				
	170 00		170×9867=1,677,390		
1st Year expenditure on 6549 to be settled in	1966–67		370×6549=2,423,130		
2nd ,, ,, 6549 ,, ,,	1966–67			170×6549=1,113,330	
1st ,, ,, 7620 ,, ,,	1967–68			370 x 7620=2,819,400	
2nd ,, ,, 7620 ,, ,,	1967–68				170×7620=1,295,400
1st ,, ,, 3475 ,, ,,	1968–69				370×3475=1,285,750
		†600,000	4,482,720 †600,000	3,932,730 †600,000	2,581,150 †600,000
		6,146,280	5,082,720	4,532,730	3,181,150

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† Salaries of drivers and cleaners and cost of maintenance of vehicles.

CHAPTER IV

HIGHLAND COLONIZATION SCHEMES

THE existing tea and rubber plantations were developed by investment of private capital mainly during the period when sale of crown land took place freely. Lands which had been declared crown under the Waste Lands Ordinance were sold freely for development in coffee to commence with followed by tea, rubber and coconuts. These plantation industries constitute the basis of our foreign exchange earning. This policy of free sale of crown land to private individuals ceased from about 1920 as a result of widespread protest by the peasantry and middle class who were adversely affected. The policy initiated after the Land Commission appointed in 1927 and the passing of the Land Development Ordinance subsequently was oriented towards the giving of land to the peasantry and the middle class under restricted tenure. The dry zone colonization schemes as well as land for village expansion in populated areas was given under this policy. The policy of the colonization of the dry zone was to considerably relieve the problem of landlessness and unemployment in thickly populated areas. As it was not sufficient to meet the problems created by the rapid increase in population and the growing unemployment, major colonization schemes provided for the settlement of 4,000 to 5,000 families annually in these schemes, thus enabling transfer each year of approximately 20,000 people from thickly populated areas to the scantily populated dry zone.

With a view to meeting the urgent need for further avenues of employment and land for the landless the development of highland areas was undertaken. A survey of available crown land for development in commercial crops carried out disclosed that approximately 150,000 acres were yet available for development in tea, rubber and coconuts. The policy followed in the development of these highlands was the state plantation by the State Plantations Corporation which provided employment for the unemployed and underemployed in the areas where these plantations were opened. For the development of commercial crops on a small scale by peasant allottees peasantry schemes have been set up in several places under the new policy. The Land Commissioner's Department established factories in areas where production is sufficient to keep the factory in full production. Three such factories have been established at Kalabowitiyana, Derangala and Delgoda. The scheme of assistance for cultivation of tea was as follows :—

The colonist is given a subsidy of Rs. 4,000 per family for the development of 2 acres in tea. The subsidies paid to the allottee and other costs to Government are as follows :—

	Rs. c.	Rs. c.
(1) Transport of colonist		75 00
(2) Subsidy for implements		30 00
(3) Subsidy for temporary hut		80 00
(4) Jungle clearing, burning, stumping @ Rs. 200 per acre for 2¼ acres		450 00
(5) Subsidy for holing @ 04 cts. per hole		550 00
(6) Manure :		
Saphos Phosphate, 350 lbs. per unit @ Rs. 10 per unit	32 00	
1st year 3 issues @ ½ oz. per plant	189 00	
2nd year 3 issues @ ¾ oz. per plant	283 50	
3rd year 3 issues @ 1 oz. per plant	378 00	882 50
(7) Tea seed at half maund per acre Rs. 300 per maund		300 00
(8) Re-supplying		100 00
(9) Subsidy for soil conservation measures		250 00
(10) Subsidy for green manure and shade		50 00
(11) Subsidy for disease and pest control		25 00
(12) Maintenance and weeding Rs. 10 p.m. for a period of 2 years		480 00
(13) Subsistence allowance for 9 months @ Rs. 50 p.m.		450 00
(14) Supervision		278 00
		4,000 50

Apart from the above assistance in the form of direct subsidies, the colonist was also provided with a house, latrine and civic amenities as in Colonization Schemes by the Land Development Department. The present method is to provide a subsidy of Rs. 1,000 for the house and Rs. 100 for the latrine which the allottee is required to construct. Apart from these the proportionate cost of providing the necessary amenities would be about Rs. 1,170 per colonist in addition to survey charge of Rs. 400. The cost of the well and internal roads would be about Rs. 300. The present expenditure per colonist in a Highland Colonization Tea Scheme would therefore be about Rs. 7,500.

In the case of rubber the subsidy adopted is as follows :—

		Rs. c.
(1) Transport of colonist to Scheme		75 00
(2) Subsidy for implements		25 00
(3) Subsidy for temporary hut		80 00
(4) Fencing		250 00
(5) Jungle clearing, burning, stumping @ Rs. 200 per acre for 3 acres		600 00
(6) Subsidy for soil conservation measures		187 50
(7) Cover crops		50 00
(8) Subsidy for highland crops on homestead		50 00
(9) Rubber plants at 75 cts. per plant at 200 plants per acre 2½ acres		375 00
(10) Manure :	*Rs. c.*	
First year 1 lb. Saphos Phosphate per tree—500 lbs.	50 00	
Second year to 7th year 215 @ 2, 2½, 3 and 4 years, *i.e.*, 17 lbs. per tree—8,500 lbs. @ 15 cts.	1,275 00	
		1,325 00
(11) Subsistence allowance for 12 months at Rs. 50 per month		600 00
(12) Subsistence for weeding before manuring in 3rd and 4th years @ Rs. 60 per acre		120 00
(13) Cost of supervision		500 00
		4,237 50

In addition to the above direct subsidies the colonist is also provided with a subsidised house and latrine (Rs. 1,000 and Rs. 100 respectively). Similar expenditure is incurred by the Government on the cost of public buildings, communal wells, internal roads, survey charges, etc., as in the Tea Schemes. Hence the total cost to Government in this case too will be about Rs. 7,500.

In the case of coconuts the subsidy granted to the allottees is on the following basis :—

	Rs. c.
(1) Transport of colonist to the scheme	100 00
(2) Subsidy for implements	25 00
(3) Subsidy for temporary house	80 00
(4) Jungle clearing and burning 5 acres @ Rs. 100 per acre	500 00
(5) Soil conservation measures	187 50
(6) Subsidy for fencing	500 00
(7) „ „ plantain suckers	300 00
(8) „ „ coconut husks	157 50
(9) „ „ coconut seedlings	150 00
(10) Subsidy for well	1,000 00
(11) Manure for 3rd year to 7th year	500 00
(12) Subsistence for 6 months @ Rs. 50 p.m.	300 00
(13) Subsidy for animal husbandry	300 00
(14) Supervision	400 00
	4,500 00

In addition to this assistance the allottee also receives the usual assistance in regard to house, latrine, civic amenities, and the total cost to Government of an allottee will be about Rs. 500 less than in the case of the Tea Scheme, i.e., about Rs. 7,000 per allottee.

The following extents have been alienated for development in tea, rubber and coconuts up to end of 1962–63 :—

	ACRES	R.
1956	3,860	0
1957	3,592	2
1958	1,612	2
1959	6,194	0
1960	1,940	0
1960–61	2,738	0
1961–62	2,593	0
1962–63	5,337	2

The programme for the next 5 years for the development of highland areas in tea and coconuts are as follows :—

Tea

Based on the average performance during the last three years, the extent to be brought under cultivation in these Colonisation Schemes in the next 5 years is being fixed at 11,500 acres.

The extent to be brought under cultivation each year is as follows :—

	ACRES
1965–66	1,500
1966–67	3,000
1967–68	2,400
1968–69	2,400
1969–70	2,200

On 11,500 acres of tea, 5,750 peasant families can be settled. The total cost of the scheme will, therefore, be as follows :—

	Rs. c.
I. *Planting*	
Opening up and planting 5,750 two-acre allotments or 11,500 acres of tea—	
5750×4000	**23,000,000 00**
II. *Cottages and Latrines*	
5750×1075	**6,181,250 00**

		Rs	c.
III. *Civic Amenities*			
1. 30 schools each for 400 pupils 2. 30 Head Teachers' quarters 3. 30 Assistant Teachers' quarters 4. 30 C.OO quarters 5. 30 Post Offices 6. 30 Co-op. Societies 7. 30 Midwives' quarters 8. 30 Branch Dispensaries	@ Rs. 2,040 per allotment for 5,750 allotments	11,730,000	00
IV. *Access Roads*			
At Rs. 1,200 per allotment for 5,750 allotments		6,900,000	00
V. *Miscellaneous*			
Survey costs at Rs. 140 per allotment for 5,750 allotments		805,000	00
	Total	48,616,250	00
	Say :	49,000,000	00

Increase in National Wealth

There will be no yield from the tea during the first three years. But once these 11,500 acres of tea are in full plucking they will produce 9,200,000 lbs. of made tea per annum. Assuming that an allottee gets 25 cts. per lb. of green leaf, he will obtain a rupee per lb. of made tea. The 5,750 allottees will therefore get an annual income of Rs. 9,200,000. In addition this tea will make a contribution to revenue of Rs. 3,220,000 per annum on the present rate of export duty (i.e., 35 cts. per lb.). The annual payments will yield a further Rs. 402,500 per annum to revenue. The total annual contribution to Government revenue will therefore be Rs. 3,622,500. On an investment of Rs. 49,000,000 the annual revenue of Rs. 3,622,500 represent a return of over 7½%.

Coconut

Based on the average performance during the last 3 years, the extent to be brought under cultivation in these Colonization Schemes is being fixed.

Estimated cost of Programme

On 40,000 acres of coconut, 8,000 peasant families can be settled. The total cost of this scheme will, therefore, be as follows :—

	Rs.	c.
1. *Planting*		
Opening up and planting 8,000 5-acre allotments or 40,000 acres of coconut at Rs. 4,500	36,000,000	00
2. *Cottages*		
8,000 cottages and latrines subsidized @ Rs. 1,875 each	8,600,000	00

		Rs.	c.
3. *Civic Amenities*			
(*a*) 40 schools each for 400 pupils (*b*) 40 Head Teachers' quarters (*c*) 40 Assistant Teachers quarters (*d*) 40 C.OO quarters (*e*) 40 Midwives' quarters (*f*) 40 Branch Dispensaries (*g*) 40 Co-op. Societies (*h*) 40 Sub-Post Offices	@ Rs. 1,350 per allotment for 8,000 allotments	10,800,000	00
4. *Access Roads*			
At the rate of Rs. 1,000 per allotment for 8,000 allotments		8,000,000	00
5. *Survey Charges*			
Survey fees @ Rs. 280 per allotment for 8,000 allotments		2,240,000	00
	Total	65,640,000	00
	Say :	66,000,000	00

Increase in National Wealth

There will be no yield for the coconut during the first six years. These 40,000 acres when in full bearing will produce 80 million nuts per annum. At the average market price of Rs. 124 per 1,000 nuts the gross income accruing to the peasants will be Rs. 10 million.

In addition, the revenue to Government from export duty (or considering the indirect benefits at the duty figures) will amount to Rs. 5,360,000 at the present rate of duty of Rs. 268 per ton of copra.

Annual payments will bring in a further Rs. 560,000 to Government per annum. The total contribution to Government revenue from this scheme will be Rs. 5,920,000 a year.

CHAPTER V

VILLAGE EXPANSION AND ACQUIRED LANDS

Village Expansion Schemes

1. Till the enactment of the Land Development Ordinance in 1935 Crown lands were sold to the private sector and this procedure shut out the peasants from participating in the development of the land as they had no capital to purchase land under this procedure. After the passing of the Land Development Ordinance various surrounding villages were marked out for village expansion and was reserved for the use of villagers. High priority was given to the alienation of land for meeting landlessness and under-employment in these areas. Schemes of assistance were also drawn up to help the peasant allottees to develop the land. The unit of alienation varied in accordance with the availability of land from 1 to 3 acres except in the plantation blocked villages of the whole country where the availability of Crown land was very limited.

2. The scheme of assistance for allottees under the village expansion schemes provided for a subsidy for the construction of sanitary houses with the minimum requirements of latrine and a well as well as the supply of necessary planting material for the development of the land. Lands falling under small tanks restored in village areas were also alienated for paddy cultivation. A subsidy for the type-plan house with a temporary roof at present is Rs. 700 and for a house with a permanent roof Rs. 1,000. The houses can be built of brick and clay, rubble and clay and wattle and daub. Every endeavour is made to get the allottees to build houses in brick or rubble as far as possible. The subsidy is paid to the allottees in stages. The subsidy given for houses covers about 50 to 60 per cent. of the cost and the balance expenditure has to be paid by the allottee in the form of his own labour and out of his own pocket. Roads and water supply schemes are provided where these are necessary. The supervision of the construction of roads and water supply is done by the Land Commissioner who has attached to him a Central Roads Organization. The subsidy for the construction of a latrine is Rs. 75. A minimum subsidy of Rs. 300 is given for the construction of a well 12 feet or more in depth and 5 feet in diameter. In the dry zone areas this subsidy is increased to a maximum of Rs. 600 according to the size and depth. Planting material is also supplied to the village expansion allottees and the material is obtained from the Department of Agriculture. The development work in the allotment is supervised by the staff of the Land Commissioner.

Most of the village expansion allotments have been developed in crops like tea, rubber, coconut, coffee, citrus and other fruits. In the dry zone areas where due to inadequacy of rainfall permanent crops of the categories mentioned above are not possible, catch crops and dry zone vegetables are grown during the Maha season. About 310,000 acres have been alienated under village expansion up to 1955 and an addition of 230,000 acres between 1955 and 1965. The programme provides for the alienation of 25,000 acres per year to about 20,000 allottees, the construction of 3,000 type-plan houses and the necessary plant and material. The average cost per year will be about Rs. 7,000,000. An additional sum of Rs. 4,000,000 is also required annually for the provision of roads, communal wells and water supply schemes.

Village Expansion Acquisitions

3. As a result of large scale disposal of Crown land in early years to private enterprise, specially large scale investors, the villagers of the wet zone particularly had no room for expansion as very little Crown land was left over. Whatever Crown land was left was necessary for climatic soil erosion and other reasons to be preserved as forests. It, therefore, became necessary to acquire private land mainly undeveloped for alienation to the landless peasants in these areas. In certain areas where employment opportunities were available but there was no land for housing it became necessary to acquire private land for the purpose of rural housing. In the whole country whatever undeveloped land was available and suitable has been acquired but, in view of the large scale extents of tea plantations there was no room for expansion of the villages. This problem was gone into by the Kandyan Peasantry Commission and the question of acquiring undeveloped land in tea estates as well as developed land, where absolutely essential, became pressing. In 1963, it was decided that where the pressure of population was very great acquisition of even developed land should be taken up to 2 per cent. of the planted area in each district. About 4,000 acres had to be acquired under this Scheme in the Kandy, Nuwara Eliya, Badulla and Matale districts. The same schemes of assistance extended to village expansion allottees to whom Crown lands are given are also extended to allottees settled on allocated land. The expenditure of assistance for this purpose has already been included in the preceding paragraph. About 15,500 acres were acquired up to the end of 1955 for village expansion and an additional 14,500 between 1955 and 1963. The cost of acquisition per year will be about Rs. 4,000,000.

CHAPTER VI

YOUTH SETTLEMENT SCHEMES

1. The Central Bank's Consumer Finance Survey of 1963 assessed that out of the 11 million population of this country, 3.5 million comprised the total work force of which 450,000 were unemployed. The largest single category among the unemployed consists of those belonging to the age group 18-25 years, with the G. C. E. or S. S. C. educational qualifications, numbering 78,900. The importance of providing employment for this category of person is self evident but the urgency of the problem is revealed with the knowledge that there are one million school children between the ages 12-18. Therefore the unemployed in this category will swell in dynamic progression in the next decade. It is in this context that it is urgently necessary that this youth be attracted to an agricultural occupation.

2. Unfortunately the youth of this country are inclined to an urban living with white collar employment, because small scale agriculture has so far produced small scale productivity and income. Therefore, any attempt to wean this category of persons to agriculture must be with an assurance that this type of agriculture will be able to provide a minimum wage comparable with that of the city dweller. The object of the unemployed youth settlement programmes should be to secure a minimum income of Rs. 250 per month for the settler. This can only be achieved by introducing scientific techniques of close cropping with the use of fertilizers and weedicides and a basic mechanization with an emphasis on the production of profitable food crops like chillies, onions and ground-nuts and off season cash crops like gingelly and tobacco. Besides these food crops the settlers will be induced to take to poultry, livestock and apiary keeping to enable them to obtain an additional income.

3. The Ministry of Land, Irrigation and Power together with the Ministry of Agriculture and Food can make a substantial contribution to executing this programme by appropriate orientations in policy with regard to land alienation. The orientations proposed is a programme for the settlement of unemployed youth in viable communities on new land with the following features :—

(i) All development work of a skilled and semi-skilled nature contributed as Shramadana by youth working initially in camps and receiving only food and a subsistence allowance ;

(ii) Government contribution to be restricted to equipment materials, subsidies, technical supervision and organization.

4. It is envisaged that the programme will broadly consist of 3 types of schemes :—

(*a*) Colonization based on minor irrigation tanks and where possible as part of major irrigation schemes ;

(*b*) Colonization based on lift irrigation schemes from wells or from rivers ;

(*c*) Highland colonization schemes in tea, rubber, coconut or subsidiary crops or livestock rearing as determined by local conditions.

5. The settlers under any particular scheme will be primarily selected from unemployed youth in the area who have a desire and aptitude for settlement as peasant colonists. It is intended that the selectees for each scheme form themselves as early as possible into self-contained co-operative societies and till then contribute their Shramadana labour in return for only a minimum allowance or subsidy and the provision of food. It will be left to the choice of the young colonists through their co-operative organization to determine at the right time whether the settlement should be run on the basis of individual allotments or entirely as co-operatives, or on the basis of individual ownership but co-operative operation. In order to ensure maximum productivity and the most economical working of these schemes, the last basis is generally the most satisfactory and every attempt will be made to induce the young co-operative communities to adopt this mode of settlement and development. The units of alienation will normally be 2 or 3 acres of irrigable land and 2 acres of highland, but there must be scope for variation in these standard units to suit the requirements of particular schemes in order to obtain the minimum income of Rs. 250 per month per settler.

6. Investigations made so far indicate a potential for setting up approximately 235 settlements over a period of 5 years. The programme will be phased as follows :—

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25 settlements in 1965
35 settlements in 1966
50 settlements in 1967
50 settlements in 1968
75 settlements in 1969

On the average each settlement will consist of between 75 and 100 youths. It would mean that these settlements alone would absorb between 20,000 to 25,000 unemployed youth in agricultural occupations with a further 3,000 persons provided employment in ancillary or service occupations in the same settlements. At least 60,000 acres of new land will be brought under cultivation through these youth settlements.

7. The following forms of assistance are proposed to the settlers :—

(*a*) A subsistence allowance of Rs. 1·50 per day per head for two years ;

(*b*) Food and work Rs. 1·50 per day per head for 24 months from the World Food Programme;

(*c*) Transport, implements, basic clothing, seed and planting material, initial temporary accommodation as well as subsidies for housing ;

(*d*) The construction of community buildings in due course as necessary in each settlement, towards the cost of which also the maximum amount of volunteer labour will be applied by the youths themselves ;

(*e*) A tractor trailer and agricultural implements to be gifted through the FAO—Freedom from Hunger Campaign and partners.

8. The payment of a daily allowance is in order to provide the youth with an assured means of living during the period in which he is developing the land. The existing practice in the older colonization schemes has been to pay the colonists subsidies in relation to the work completed. This practice although it has its safeguards in that work has to be completed before the payment is made also has a tendency to create rural indebtedness because the colonists invariably have to have recourse to the credit facilities offered by local traders. The payment of a daily allowance on the other hand will assure a living and secure freedom from want and hunger until the land is developed and production is commenced. It will also enable the settler to be free of debt when he starts production.

9. As regards the food contribution, an application has been made to the World Food Programme to finance in part at least the food elements in these schemes, i.e., the cost of feeding and subsistence of the settlers during the first two years. It is also desirable that every effort be made to explore other sources for aid for the programme which is likely to attract much sympathy and support from International organizations such as F. A. O., I. L. O., UNICEF and from friendly countries.

10. The cost of these schemes is set out below. The table indicates foreign aid, Government costs, the savings to Government in comparison to the expenditure that would have been incurred in normal colonization schemes and the value of voluntary labour or Shramadana contributed by the settlers :—

	Foreign Aid	*Voluntary labour or Shramadana Value*	*Proposed Scheme*	*Present Government Costs*
1. Tank Irrigation Schemes (6,750 colonists)	9,000,000	28,000,000	60,000,000	Rs. *61,000,000
2. Lift Irrigation Schemes (5,000 colonists)	8,000,000	22,000,000	22,000,000	*45,000,000
3. Tea Schemes (5,000 colonists)	7,000,000	27,000,000	30,000,000	*32,000,000
4. Coconut (2,500 colonists)	3,000,000	13,000,000	15,000,000	*15,000,000
	27,000,000	90,000,000	127,000,000	*153,000,000

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* The figures are worked to the nearest million.

The expenditure will be phased as follows :—

Year	*Government Costs* *Rs.*	*Food Aid* *Rs.*	*Settlers*
1965–66	3,455,000	3,600,000	2,250
1966–67	9,759,150	6,300,000	3,000
1967–68	19,626,650	6,300,000	4,500
1968–69	24,001,150	6,300,000	4,500
1969–70	27,346,150	6,300,000	5,000

The balance expenditure will be incurred only in the next five-year period.

CHAPTER VII

LAND DEVELOPMENT

1. Reference has been made earlier to the development of colonisation schemes and to the policy decided in 1939 of bringing the colonists to the fully developed land where the jungle had been cleared, stumped and ridged with cottages and other facilities like roads, etc., provided. This development work was at first handled by the Land Commissioner but as the pace of colonisation increased with growing problems of unemployment and landlessness it became necessary to set up a separate department to handle the work.

2. The Land Development Department provided all the amenities required for a colonist family to settle down in their new environment. These included the clearing of jungle by departmental labour both in the paddy and highland allotments, the construction of roads and wells, and the building of cottages and latrines for the colonists. The Department also constructed schools, dispensaries, central dispensaries, co-operative stores, and post offices for the colonists. Central schools, and rural and district hospitals were also provided in large schemes. Quarters were constructed for the Colonization officers, and Overseers of Land Allotments under Land Development Ordinance (O/L. D. O. AA) who were Government officers placed in permanent and immediate administrative charge of each colony.

3. Similar facilities were provided by the Land Development Department in highland colonization schemes where land is alienated to landless families for the cultivation of tea, rubber, and coconut. In these cases particularly in the hilly areas in Kalutara, Galle, and Matara Districts the Department built metalled and tarred roads in the schemes whereas in the paddy schemes only gravelled roads were provided. Appendix ' C ' to this Chapter gives statistics of work done by the Land Development Department since its inception.

4. All this work was done by the Department using a permanent labour force of masons, carpenters, and unskilled labourers. The Department has also a large cadre of technical officers in immediate supervision of construction units. Working by means of a permanent labour force which is entitled to the usual amenities that are given to Government servants such as leave, railway warrants, etc., and special amenities that are necessarily given to men working far away from their homes in remote jungles; heavy costs have to be incurred as departmental overheads. On the other hand without an organization of this nature it would be impossible to carry through these programmes in the schemes. However, the question of reducing the cost to Government in the provision of basic amenities to colonists has always been considered by the Department.

5. Thus the unit cost in 1956 which was Rs. 8,938 per colonist has been steadily reduced to Rs. 4,185 per colonist in 1964/65. This has been achieved—

(i) by reducing the extent alienated from 5 acres paddy land and 3 acres highland to 2 acres paddy land and 1 acre highland.

(ii) by systematically reducing the size of the permanent cottage given to each colonist.

(iii) in lieu of clearing jungle by using departmental labour a subsidy of Rs. 100 per acre was paid to colonists for clearing jungle themselves.

(iv) as from 1963/64 the Department ceased to construct cottages for colonists selected from that year onwards. Instead a subsidy of Rs. 1,000 was to be paid for building their own cottages according to the departmental type plan.

6. The following is the break up of the unit cost of Rs. 8,938 per colonist which was the prevailing rate in 1956 :—

	Rs.	*c.*
Colonist camps	140	00
Fencing	448	00
Clearing—(*a*) Subsidy	—	
(*b*) Departmental Unit	1,600	00
Ridging	200	00
Stumping	200	00
Cottages	2,000	00
Latrines	150	00
Wells	180	00
Roads	150	00
General Buildings—		
(*a*) Education	320	00
(*b*) Health	125	00
(*c*) Co-operative Stores	30	00
(*d*) Postal facilities	50	00
(*e*) Colonization officers quarters	100	00
(*f*) Overheads (Field camps)	445	00
(*g*) ,, (Labour)	1,895	00
(*h*) ,, (Other)	905	00
Total ..	8,938	00

7. The complete eradication of malaria is probably the most important event in the development of the Dry Zone areas of the Island. The increase in population created a tremendous demand for land and there was a steady flow

of surplus population from the highly populated areas of Ceylon to the Dry Zone. It was, therefore, decided not only to reduce the extent of the paddy unit from 5 acres to 3 acres but also to bring the colonists before irrigation facilities are provided. They themselves cleared the paddy allotment as well as the highland areas on the payment of a subsidy. They were also given work on the construction of channels and B. O. P. roads. They carried out Chena cultivation on their paddy and highland allotments till such time as irrigation facilities were provided. The cost of settling an allottee under this scheme was approximately as follows :—

	Rs. c.
Colonist Camps	140 0
Fencing	280 0
Clearing—(*a*) Subsidy	500 0
(*b*) Departmental Unit	Nil
Ridging	120 0
Stumping	200 0
Cottages	2,000 0
Latrines	150 0
Wells	180 0
Roads	150 0
General Buildings—	
(*a*) Education	320 0
(*b*) Health	125 0
(*c*) Co-operative stores	30 0
(*d*) Postal facilities	50 0
(*e*) Officers quarters	100 0
(*f*) Overheads (Field camp)	280 0
(*g*) „ (Labour)	1,100 0
(*h*) „ (Other)	575 0
Total ..	6,300 0

8. With a further increase of population the unit of alienation was again reduced from 3 acres paddy land and 2 acres highland to 2 acres paddy land and 1 acre highland. In order to reduce the expenditure on departmental construction of houses which cost Government anything between Rs. 2,500 to Rs. 3,000 it was decided to pay a subsidy of Rs. 1,000 per type plan house.

The expenditure at present incurred by the Government on an allottee is as follows :—

	Rs.	*c.*
Colonist camp	200	0
Fencing	168	0
Clearing—(*a*) Subsidy	300	0
(*b*) Departmental Unit	Nil	
Ridging	80	0
Stumping	100	0
Cottages	1,000	0
Latrines	150	0
Wells	225	0
Roads	150	0
General Buildings—		
(*a*) Education	390	0
(*b*) Health	140	0
(*c*) Co-operative Stores	40	0
(*d*) Postal Facilities	70	0
(*e*) Colonization officers quarters	130	0
(*f*) Jungle clearing for building Units	18	0
(*g*) Overheads (Field camp)	172	0
(*h*) " (Labour)	492	0
(*i*) " (Other)	360	0
Total ..	4,185	0

9. With effect from 1965-66 a further reduction in unit costs is proposed as follows :—

Up to now colonists were settled in their highland allotments in groups of roughly 200 colonists to each Civic Centre. The facilities provided at a Civic Centre to serve such a group are given below :—

(*a*) 1 School (T. P. 298)
(*b*) 1 School (T. P. 269A)
(*c*) 1 Teachers Quarters
(*d*) 2 Asst. Teachers Quarters
(*e*) 1 Midwife's Quarters
(*f*) 1 Branch dispensary
(*g*) 1 Sub-Post Office
(*h*) 1 Colonization Officers Quarters
(*i*) 2 O/L. D. O.'s Quarters
(*j*) 1 C. O's Office and Waiting Hall
(*k*) 1 Co-operative Stores
(*l*) 4 Wells for quarters
(*m*) 2 Two compartment latrines for school
(*n*) 170 chains fencing 5 strands and 12 gates for quarters, etc.

With effect from the current financial year it is proposed to settle colonists in groups of 600 to each Civic Centre where possible providing all the major Civic needs to serve a group of 600 colonists in that centre. Thus by providing facilities for 600 colonists in 1 Civic Centre instead of for 3 groups of 200 in 3 Civic Centres a substantial reduction in cost per colonist can be achieved. In addition to this it is proposed beginning from this financial year to reduce the cost of subsidy on latrines by 50%, i.e. reducing this to a subsidy of Rs. 75 per latrine to each colonist. The facilities that will be provided in a Civic Centre designed to serve 600 colonists are given below. (Where less than 600 colonists are settled around a Civic Centre, e.g. on a small colony these facilities will be reduced accordingly).

Educational	*Rs.*	*c.*
1 School for 1,200 pupils	128,000	0
1 Playing field of 4½ acres	5,000	0
1 Principal's quarters	18,500	0
1 Vice-Principal's quarters	10,500	0
3 Assistant Teachers quarters	18,500	0
2 Sets unmarried teachers quarters for 16 teachers	40,000	0
1 Science laboratory	25,000	0
4 Wells	8,600	0
2 Sets School lavatories	2,500	0
Fencing and Gates	3,000	0
10 acres irrigable land (5 acres paddy land and 5 acres for other crops) for practical agriculture	10,000	0
	269,600	0
Medical for 600		
1 Central dispensary	22,500	0
1 Apothecaries quarters	18,500	0
1 Midwife's quarters	6,150	0
2 Wells	4,250	0
Fencing and Gates	2,000	0
	53,400	0
Commercial for 600		
1 Co-operative Stores (large buildings)	15,000	0
15 Chains fencing and gates	912	50
	15,912	50
Postal for 600		
1 Sub-Post Office	10,350	0
15 Chains fencing and gates	562	50
1 Gate	350	0
1 Latrine	375	0
1 Well	2,200	0
	13,837	50

These are the bare costs of construction excluding departmental overheads. In addition to these roads, wells, and the requisite number of quarters for Colonization officers and O/L. D. O. AA will also be provided.

For a unit of 1,000 colonists the department constructs a Maternity Home. Every 2,000 colonists are entitled to a Rural hospital and every 4,000 colonists and above to a District hospital and a Central School. The question of building Police stations in large schemes is also being examined by the Department.

10. It is also proposed to amend the policy of the Land Development Department in two other aspects.

(*a*) The purpose of these new policies is to give a better deal to the colonists who are put to unnecessary hardship by certain aspects of land policy as they now stand. Firstly, the present policy as has already been pointed out is to give the colonists a subsidy of Rs. 100 per acre to clear jungle. Seeing that each colonist is given 1 acre of highland and 2 acres of paddy land it follows that he would be given Rs. 300 to clear 3 acres jungle. The practice is for the colonist to be brought in during the year of selection by about June. He is accommodated in temporary wadiyas built by the Land Development Department and is expected to clear his 2 acres of paddy land and live in temporary huts on this land while cultivating it with a chena paddy crop. He clears his highland allotment in the following year. This policy has resulted in considerable hardship to colonists, seeing that they have to settle down to the task of jungle clearing as soon as they are brought in and live for a considerable period in wadiyas away from their homes and families. The Department therefore, proposes to clear with departmental labour the 1 acre highland allotment for each colonist so that as soon as the colonist arrives on the scene by the end of August he would have land already cleared available for him to plough and sow with his chena crop. He could also immediately get down to the task of putting in his permanent plantations. In addition to this it would be possible for him to set about constructing his permanent house. All this would mean less hardship to the colonist and quicker absorption into his new environment.

(*b*) In lieu of building cottages for colonists, as from 1963-64, Government decided to give each colonist a subsidy of Rs. 1,000 for the construction of a type plan house. It has been found, however, that with this meagre subsidy the colonist would not be in a position to construct anything other than a wattle and daub semi-permanent cottage.

The cost of labour and materials alone for a cottage built according to departmental type plan No. 705 is Rs. 1,650 for a cement brick house and Rs. 1,700 for a burnt brick house. Thus a colonist would be compelled to put in at least Rs. 650 of his own money to build himself a permanent cottage. This he cannot possibly do. It has, therefore, been decided to increase the subsidy to Rs. 1,250 and for Government Agents to organize colonists into Shramadana groups who by contributing their free labour would be able to build a house worth a minimum of Rs. 1,650 each. The Land Development Department will provide materials such as cement, sawn timber, tiles, together with transport and technical supervision. The colonists are expected to put in all the necessary labour required to make cement bricks and build the cottages.

11. Pilot projects have been started on this basis at an acquired estate near Welisara in Colombo District, at Attaragollawewa in Polonnaruwa District, and at Mahakanadarawa, and Ranjangana in Anuradhapura District. These are progressing satisfactorily. Under the present policy as applicable to the financial year 1964/65 the unit cost to the Land Development Department per colonist was Rs. 4,185. It is possible without exceeding this figure to introduce the 3 new major amendments in policy that have now been agreed upon viz : the construction of General Buildings in Civic Centres designed to serve 600 units, the clearing of highland by Land Development Department Labour, and the construction of type plan cottages on a Shramadana basis on a subsidy of Rs. 1,250 per cottage.

12. The cost of settlement per unit under the proposed scheme is given below:—

	Rs.	*c.*
Colonists camp	78	0
Fencing	168	0
Clearing (*a*) Subsidy	200	0
(*b*) Departmental Unit	220	0
Ridging	80	0
Stumping	100	0
Cottages	1,250	0
Latrines	75	0
Wells	225	0
Roads	150	0
General Buildings—		
(*a*) Education	448	0
(*b*) Health	89	0
(*c*) Co-operative Stores	27	0
(*d*) Postal facilities	23	0
(*e*) Colonization Officers Quarters	130	0
(*f*) Jungle clearing for building unit	11	0
(*g*) Overheads (field camp)	150	0
(*h*) " (Labour)	447	0
(*i*) " (Other)	314	0
Total ..	4,185	0

13. The cost of infra structural items such as rural hospitals, district hospitals, central schools, and police stations are not included in the Unit cost.

14. The proposed programme of the department for the 5 year period 1966/67 to 1970/71 is shown in Appendix " A ". Appendix " B " gives the break up of the total expenditure expected to be incurred by this department

indicating the foreign cost and the local cost separately. The foreign cost covers mainly the approximate cost to the Department of the imported cost of the minimum requirements of vehicles and machinery necessary if the departmental programme is to be effected. A large proportion of the department's equipment at present is old and uneconomic to maintain. The minimum requirements of vehicles, machinery and equipment that is needed by this Department for immediate purchase during the financial year 1966/67 is given below. 25% of these will be necessary every year during the 4 following years :—

	Rs.	c.
45 Lorries	900,000	0
25 Bowsers	650,000	0
5 Jeeps	60,000	0
2 Station Waggons	27,000	0
3 Vans	33,000	0
30 Wheeled tractors	260,000	0
60 Tractor trailers	152,000	0
5 Motor graders	70,000	0
9 Road Rollers	270,000	0
1 Mobile crane	40,000	0
12 Concrete Mixers	132,000	0
6 Stone Crushers	150,000	0
7 Lighting plants 16 KW	70,000	0
11 Concrete Vibrators	55,000	0
7 Compressors with engines	91,000	0
3 Engines for Saw Mills	120,000	0
40 Motor Pumps	56,000	0
9 Tar Boilers	12,000	0
9 Crawler tractors Caterpillar D4 Type	360,000	0
8 Crawler tractors Caterpillar D8 Type	720,000	0
Accommodation for stores and workshop 10,000 sq. ft. (framework, roof and cladding)	100,000	0
100 Units of Aluminium prefabricated buildings with slotted angle (framework, roof, and cladding with aluminium sheets)	1,000,000	0
	5,328,000	0

This requirement of equipment will cover :—

(*a*) The normal work done by the Land Development Department with its own funds.

(*b*) Work done by the Land Development Department under the Youth Settlement Schemes.

(*c*) Work done for other Departments under the Works Done Advance Account of the Land Development Department.

APPENDIX 'A'

ANTICIPATED EXPENDITURE 1966/67 TO 1970/71

	1966/67		1967/68		1968/69		1969/70		1970/71		Total	
	Units	*Costs*	*Units*	*Cost*	*Unit*	*Cost*	*Unit*	*Cost*	*Units*	*Cost*	*Units*	*Costs*
Advance Alienation Camps Departmental clearing (acres)	7233	2,777,472	7233	2,777,472	5000	1,920,000	5000	1,920,000	5000	1,920,000	29466 Ac.	11,314,944
Clearing of Paddy lots	14466	2,893,200	14466	2,893,200	10000	2,000,000	10000	2,000,000	10,000	2,000,000	58932	11,786,400
Fencing	6000	1,008,000	6000	1,008,000	6000	1,008,000	6000	1,008,000	6000	1,008,000	30000	5,040,000
Stumping and ridging	6000	1,080,000	6000	1,080,000	6000	1,080,000	6000	1,080,000	6000	1,080,000	30000	5,400,000
Cottages	5000	6,250,000	5000	6,250,000	5000	6,250,000	5000	6,250,000	5000	6,250,000	25000 No.	31,250,000
Latrines	5000	375,000	5000	375,000	5000	375,000	5000	375,000	5000	375,000	25000 ,,	1,875,000
Wells	250	1,033,750	250	1,033,750	250	1,033,750	250	1,033,750	250	1,033,750	1250 ,,	5,168,750
C. O's Office	10	84,630	10	84,630	10	84,630	10	84,630	10	84,630	50 ,,	423,150
C. O's quarters	10	350,610	10	350,610	10	350,610	10	350,610	10	350,610	50 ,,	1,753,050
O/LDO's Quarters	20	129,260	20	129,260	20	129,260	20	129,260	20	129,260	100 ,,	646,300
Schools	20	1,710,260	20	1,710,260	20	1,710,260	20	1,710,260	20	1,710,260	100 ,,	8,551,300
Principals Quarters	4	140,224	4	140,224	4	140,224	4	140,224	4	140,224	20 ,,	701,120
Vice Principals Quarters	12	242,172	12	242,172	12	242,172	12	242,172	12	242,172	60 ,,	1,210,860
Teachers Quarters (Assistant) ..	25	302,250	25	302,250	25	302,250	30	362,700	35	423,150	140 ,,	1,692,600
Unmarried Teachers Quarters	5	187,625	5	187,625	10	375,250	10	375,250	10	375,250	40 ,,	1,501,000
Midwife's Quarters	10	120,900	10	120,900	10	120,900	10	120,900	10	120,900	50 ,,	604,500
Branch Dispensaries	8	97,832	8	97,832	8	97,832	8	97,832	8	97,832	40 ,,	489,160
Central Dispensaries	5	212,505	5	212,505	5	212,505	5	212,505	5	212,505	25 ,,	1,062,525
Apothecary's Quarters	5	175,305	5	175,305	5	175,305	5	175,305	5	175,305	25 ,,	876,525
Maternity Home	2	152,520	2	152,520	2	152,520	2	152,520	2	152,520	10 ,,	762,600
District Hospitals	—	—	—	—	1	500,000	1	500,000	1	500,000	3 ,,	1,500,000
Central School	1	1,500,000	—	—	1	1,500,000	1	1,500,000	—	—	3 ,,	4,500,000
Police Station	1	200,000	—	—	1	200,000	1	200,000	—	—	3 ,,	600,000
Plant Machinery, &c.	—	5,328,000	—	1,207,000	—	1,207,000	—	1,207,000	—	1,207,000	—	10,156,000
Co-operative Stores	15	219,225	15	219,225	20	292,300	25	365,375	25	365,375	100 ,,	1,461,500
Sub Post Office	10	199,020	10	199,020	10	199,020	10	199,020	10	199,020	50 ,,	995,100
Wells for G. BB	40	163,680	40	163,680	40	163,680	40	163,680	40	163,680	200 ,,	818,400
Latrines for G. BB	24	51,160	24	51,160	24	51,160	24	51,160	24	51,160	120 ,,	255,800
Roads (BOP)	90	650,340	90	650,340	90	650,340	90	650,340	109	788,000	469 mls.	3,389,360
Roads Major	10	700,000	10	700,000	10	700,000	10	700,000	10	700,000	50 ,,	3,500,000
Establishments .. .. **(Office Workshop, Saw mills) Buildings, Stores, LDO's and Clerks Quarters, Circuit Bungalows, Tea Leaf sheds, Manure sheds and miscellaneous buildings.**	—	1,000,000	—	1,000,000	—	1,000,000	—	1,000,000	—	1,000,000	—	5,000,000
		29,334,940		23,513,940		24,223,968		24,357,493		22,855,603		124,285,944

APPENDIX 'B'

LAND DEVELOPMENT DEPARTMENT FIVE-YEAR PLAN

Programme and Provision

Year	Foreign Cost Rs.	Local Cost Rs.	Total Rs.
1966/67	6,288,276	23,046,664	29,334,940
1967/68	2,099,276	21,414,664	23,513,940
1968/69	2,127,676	22,096,292	24,223,968
1969/70	2,133,016	22,224,477	24,357,493
1970/71	2,072,948	20,782,755	22,855,703
Total ..	14,721,192	109,564,852	124,286,044

APPENDIX 'C'

LAND DEVELOPMENT WORKS

Year	Land Development			Houses and Roads						Civic Facilities							Expenditure
	Felling	Burning	Ridging	Handed over	Cottages built	Latrines	Wells	Qrs. L.D. O., C.O., A.I., etc. & Officers Units	Qrs. for Officers Police Units	Health				Co-op. Store	Schools & Qrs.	Post Offices	Expenditure millions
										R. H.	M. H.	C.D.B.D.	Qrs.				
	Acs.	Acs.	Acs.	No.	No.	No.	No.			No.	No.	No.	No.				
1948–49	N.A.	N.A.	N.A.	21,487	2,954	N.A.	N.A.	N.A.	—	—	—	—	—	—	—	—	14·458
1949–50	—	—	—	13,248	3,246	—	—	—	—	—	—	—	—	—	—	—	13·515
1950–51	—	—	—	8,087	4,149	—	—	—	—	—	—	—	—	—	—	—	16·513
1951–52	12,284	12,298	5,456	7,700	3,589	—	—	47	—	—	2	8	23	12	54	—	20·881
1952–53	14,530	12,732	7,952	12,963	2,659	2,908	315	45	2	—	1	16	25	28	52	3	18·898
1953–54	16,864	16,169	5,503	13,554	3,064	3,411	129	14	1	1	1	7	17	14	39	—	14·484
1954–55	17,140	12,010	1,671	13,311	2,651	2,454	71	20	—	—	—	6	8	9	22	2	11·756
1955–56	21,075	19,471	2,879	9,478	1,363	1,281	90	17	—	—	—	12	13	13	31	9	13·603
1956–57	13,877	11,106	—	—	3,863	2,470	138	17	—	—	—	6	10	9	24	7	15·063
1957–58	7,903	3,306	—	—	1,568	2,443	82	7	—	—	—	9	5	12	38	2	17·496
1958–59	5,016	6,006	—	—	2,759	2,061	107	17	—	†	—	8	3	7	60*	6	22·230
1959–60	2,960	2,815	—	—	1,405	1,769	48	27	—	†	1	6	8	8	31*	3	22·333
1960–61	2,114	1,660	—	—	2,239	1,764	78	61	—	†	—	8	14	14	76*	9	21·484
1961–62	1,708	1,390	—	—	3,152	2,563	71	24	—	†	—	7	5	5	38*	8	23·667
1962–63	584	395	—	—	2,065	1,959	83	41	—	—	—	9	11	19	63	12	22·310
1963–64	—	—	—	—	890	861	117	47	—	—	2	13	11	9	43	6	15·399

* Polonnaruwa Central School was under construction.

† Hingurakgoda Hospital was under construction.

CHAPTER VIII

CITRUS CULTIVATION

Citrus is grown all over the Island as a "backyard plantation". There are no real citrus groves and the largest indigenous plantation does not exceed 7 to 8 acres. The total extent of land under citrus, inclusive of single trees, is about 10,000 to 12,000 acres. Citrus in Ceylon has been declining over the last several years. In 1963 the services of Dr. Kurt Mendel of Israel was obtained to report on the causes of the decline of citrus in Ceylon and to suggest methods for improving the orchards in the areas where the decline is rampant as well as in the new areas where citrus might successfully be grown. Dr. Kurt Mendel investigated the causes of the decline of citrus and has attributed the causes of decline to lack of soil depth, insufficient or no irrigation, lack of cultural practices and fertilizing, lack of adequate lighting, absence of weed and pest and disease control as well as the presence of virus diseases. According to Dr. Kurt Mendel, even if the virus diseases are prevalent, citrus can be successfully cultivated if other conditions of cultivation are at optimum level. As regards new areas for development of citrus Dr. Mendel has stated that suitable soils for the cultivation of citrus are found in the Mannar Mullaitivu areas. Following on the visit of Dr. Mendel, Mr. Y. Gevrieli visited the Island to report on the assistance the Israeli Government could extend to Ceylon both in citrus cultivation and in the development of the dry zone. Mr. Gevrieli reported that the Gal Oya delta has soil and general conditions which appear excellent for large-scale citrus cultivation. The difficulty in this area is lack of water resources and the survey for underground water is a pre-requisite for development. The area between Puttalam and Mannar extending northwards to Mullaitivu is suitable for citrus depending on the availability of ground water resources. Reference has been made earlier to the proposals for the development and exploitation of ground water resources. Depending on the success of this, citrus cultivation can be undertaken on a large scale in the Puttalam-Mannar belt. The five year plan provides for the development by peasantry of 5,000 acres under citrus tentatively and also large-scale alienation to the middle class and private sector for development of citrus depending on the availability of ground water.

CHAPTER IX

CASHEW NUT CULTIVATION IN CEYLON

One of the crops which has assumed international economic importance in recent years is Cashew Nut. Cashew Nut is a native of South America and was introduced into Africa, India and Ceylon by the Protuguese. The main object of its introduction was to check soil erosion. Several uses are made of the product of the Cashew. The Cashew Nut kernel is consumed mainly as a " dessert " in several countries. They are used to a lesser extent in baking and in the manufacture of confectionery and in a few countries for the preparation of a " spread " cashew butter. Among tree nuts recorded in international trade, the trade in cashew nuts ranks second to that in almond nuts in volume and value. The shell of the cashew nut contains a liquid known commercially as " CNSL " (Cashew Nut Shell Liquid). Though it is sometimes referred to as " Cardol Oil ", the CNSL suitably treated has a commercial value as an ingredient in producing binder resin and also as a friction modifier. The latter has a more important usage in the fabrication of automobile brakelines. The demand for CNSL remains strong and from any given tonnage of raw nuts the value of CNSL produced paid between 15 to 20% of the value of the cashew kernel recovered. The Cashew nut shell liquid is also used as an insect repellent and as a base for corrosion resistence in marine paints as well as for lacquers and varnishes. It is also used by fishermen to tan their nets and to preserve furniture and books. The ripe cashew apple is rich in Vitamin ' C ' and is used in the preparation of cordials and jams. Cashew gum is also used as an adhesive and as a constituent for paints, varnishes and lacquers.

2. The cashew tree is not facetious about the soil conditions in which it grows. It adapts itself easily to various soil conditions without impairing productivity. As the cashew tree flourishes even on poorest soils without any fertilizer or irrigation or other cultural practices, it is an excellent crop for growth in marginal and sub-marginal lands. An average tree yields about 40 lbs. of cashew nuts and on an average 60 trees per acre can be planted. Some trees have been known to produce as much as 200 lbs. The kernel constitutes about 30% of the weight of the nuts. For an acre about 240 to 275 lbs. of kernel can be expected. The present price is about Rs. 3 to Rs. 3.50 per lb. Valued at Rs. 2 per lb. the gross income will be Rs. 500 to Rs. 540. Allowing a margin of Rs. 100 for processing and cultivation expenses, the nett income of Rs. 400 can be obtained from an acre.

3. The world production of cashew nuts is about 200,000 tons and the main producing countries are :—

.India
Mozambique
Tanganyika, and
Kenya,

which together produce 195,000 tons. India is the only country extracting and exporting cashew kernel in any volume ; but the industry is being developed in Mozambique, Brazil and Tanganyika which are now encouraging the cashew kernel export market. About half the world production of cashew nut kernels are imported by the U. S. A. In 1962/63 India exported 48,000 tons of cashew nut kernel to the value of £. 14,500,000. Of this quantity 27,000 tons was exported to U. S. A. at a value of over £. 8 million. India also exported cashew nut shell liquid at a value of £. 558,000 for 7,331 tons. India at present depends on the African countries for the import of raw nuts for processing into kernel and CNSL. With the development of processing in the African countries, a vast programme for expansion of cashew nut plantation has been undertaken in India. India proposes to double the present extent of 280,000 acres yielding about 120,000 tons of nuts a year to 560,000 acres by 1968, and a further expansion to 8,000 acres in the next 5 years. India thus hopes to eliminate her present dependence on the import of raw nuts from East Africa.

4. Cashew Nut in Ceylon has not been undertaken on a plantation basis. It is grown as a mixed garden crop in the Negombo and Chilaw districts and in various parts in the wet zone and on a large scale in Batticaloa and Trincomalee districts. The cultivation of cashew on a plantation scale was attempted at Kotukachchiya Farm but is reported to be a failure because the land is waterlogged.

5. In view of the importance of the crop as a foreign exchange earner, cashew nut deserves attention for rapid expansion. Large extents of marginal lands in the Dry Zone can be used for the propagation of the cashew. It can be grown at a lesser capital and maintenance expenditure.

6. It is proposed to establish a State run cashew plantation which will serve as a model for private investors. This plantation will be established by the State Plantations Corporation in the Mannar area alongside the proposed Citrus plantation. The capital expenditure required for opening and bringing into production cashew is very small, and the details are as follows :—

The capital cost of raising a 1,000 acre Cashew Plantation is estimated to be Rs. 650,000. This consists of :

	Rs.
(*a*) Buildings	
Farm Manager's bungalow	20,000
Four Watchers' semi-permanent cottages	10,000
(*b*) Vehicles	
Tractor and Trailer	17,500
Carts and bulls	7,500
(*c*) Wells—15 @ Rs. 4,000	60,000
(*d*) Opening up and planting	352,000
Maintenance expenditure—5 years @ 3,360 per acre per year	168,000
(*e*) Miscellaneous	15,000
	650,000

The phasing of expenditure will be as follows :—

Year	Item		Rs.
1965/66—	Buildings		30,000
	Carts, Vehicles		25,000
	200 acres opening up		70,400
	5 Wells		20,000
	Miscellaneous		4,600
1966/67—	200 acres Opening	70,400	
	200 acres upkeep	6,720	
	5 Wells	20,000	
	Miscellaneous	5,400	
			102,520
1967/68—	200 acres	70,400	
	Upkeep	13,440	
	Miscellaneous	5,000	
			88,840
1968/69—	200 acres opening		70,400
	600 acres upkeep		20,160
1969/70—	200 acres opening up		70,400
	800 acres upkeep		26,880
	5 Wells		20,000
1970/71—	1,000 acres upkeep		33,600
1971/72—	800 acres upkeep		26,880
1972/73—	600 acres upkeep		20,160
1973/74—	400 acres upkeep		13,440
1974/75—	200 acres upkeep		6,720
			650,000

From 1971/72, 200 acres will be coming into production every year and in 1975/76 the entire 1,000 acres will be in bearing. The Profit and Loss Account will then show the following results :—

> An investment of Rs. 650,000 on this project will bring in a substantial profit from 1971/72 reaching a peak of Rs. 600,000 from 1975/76 onwards.

7. Arrangements have already been made by the Land Commissioner, in consultation with the Chairman, State Plantations Corporation, the Government Agents, Mannar, Vavuniya, Trincomalee and Batticaloa for alienation of sufficient land in the course of the next few months to peasants and Middle Class persons for the expansion of Cashew cultivation. Particulars of lands selected by the Land Commissioner are as follows :—

District	*Extents Available Acres*	*For Peasants*	*For M.C.C. and other Investors*	*For State Plantation*
Mannar	5,300	1,000	3,300	1,000
Vavuniya	34,200	4,500	29,700	—
Batticaloa	1,500	1,000	500	—
Total	41,000	6,500	33,500	1,000

The Government Agents concerned have already taken action to hold Land Kachcheries for the alienation of the land.

8. In the case of lands alienated to the peasants, it is proposed to adopt the following subsidy scheme :—

First Year			
Jungle clearing and burning—Up to a maximum of	Rs.	90	per acre
Holing	„	40	„
Nursery and plants	„	15	„
Perimeter fencing for entire extent	„	250	„
Well—up to a maximum	„	600	
Where shallow wells (Thuravu) are possible the maximum payable will be	„	300	
Second Year			
Weeding	Rs.	50	
Filling of vacancies	„	25	

The unit of alienation per peasant will be about 5 acres and the total cost of establishing a peasant on an allotment for growing cashew will be Rs. 2,350.

9. 3,500 acres have been already alienated in the current year for cashew cultivation in the Mannar District and about 7,000 acres have been advertised in the Vavuniya District for cashew cultivation.

CHAPTER X

PRIVATE SECTOR PARTICIPATION IN LAND DEVELOPMENT AND FOOD PRODUCTION

Reference has been made earlier to the history of land policy in the 19th and 20th centuries. The policy in the 19th century was sale of crown land for development by private investors both foreign and local. The development first of the coffee industry and when the coffee industry declined the development of tea and rubber as well as coconut took place under this land policy. In 1918 the sale of Crown land for development by the private sector ceased because of the detrimental effects this policy hitherto followed had on the peasantry. Beginning from 1916 land was leased to the peasantry for development by them out of their own resources. When the pace of development by the peasantry proved too slow, the Government stepped in and development of Crown land after 1939 has been entirely financed by the Government. While this was essential to safeguard the peasantry, the limited financial and technical resources of the peasantry as well as the limited Government investment and construction capacities slowed the pace of development of Crown land.

2. The present distribution of the cultivated acreage is made up as follows :—

	Acres
Tea	592,000
Rubber	669,200
Coconut	1,110,000
Paddy	1,249,000
Other agricultural land	1,046,353
Total	4,666,553

The total extent of agricultural land according to the Census of Agricultural land in 1962 was 4,267,398 acres in 1946 and 4,666,553 acres in 1962 showing an increase of 399,155 acres or 9.35 percent over a period of 16 years. Population per acre of agricultural land during the period was 1.56 in 1946 and 2.24 in 1962 showing that the ratio of agricultural land to population has dropped considerably. Almost all the development of new land between 1946 to 1962 has taken place financed by the Government. The total land area of Ceylon is 15,997,900 acres of which 4,666,553 acres are under agricultural production. About 1,250,000 acres are occupied by roads, streams, reservoirs, towns and villages. About 3,500,000 acres are required as forests, natural reserves and sanctuaries and 4,750,000 acres are not available for development as they are either unsuitable or steep lands and lands over 5,000 feet. About 2,000,000 acres of land is therefore available for agricultural development.

3. The policy followed since 1939 of the Government financing and initiating the development of Crown land has certain drawbacks. The investment and construction resources available to the Government are limited. The present pace of development is about 30,000 to 40,000 acres per year and may be stepped up in the plan period to about 60,000 to 70,000 acres per year. This development is not however fast enough to meet the various problems facing the country.

4. The growing unemployment figures is one which is causing great anxiety. The possibilities of absorption in the industrial sector in the next few years of any substantial proportion of the unemployed is not possible. Government financed and initiated schemes of agricultural development can absorb a small percentage. In these circumstances, it is necessary that other means for the acceleration of the programme of land and agricultural development is essential. In the context of shortage of foreign exchange the cultivation of subsidiary food crops, lentils and grams as well as coriander and other species which at present involve foreign exchange to the tune of Rs. 150 million, is also essential. The plans for the development of animal husbandry will also increase the demand for maize and cattle fodder which at present have to be imported.

5. While, however, having the interests of the peasant as the predominant consideration in the disposal of Crown land, it is opportune to bring in the investment and technical resources of the private sector into land development and agricultural production. The Government has accordingly approved a scheme of leases of Crown land to the private sector with investment resources for development of approved agricultural crops and animal husbandry projects. In selecting land for lease to the private sector the prime consideration will be that the interests of the rural peasantry will not be affected. The leases will be generally for a duration of 25 years and the Government will have the option to resume possession on the expiry of this period. This limitation on the period of the lease will while immediately bringing into production a large extent of Crown land at no expense to Government make available at the end of the period of lease, developed land for alienation to the peasantry if the need arises. To encourage private investment in agricultural development tax incentives for expenditure on the development of land, provision of irrigation facilities, the necessary buildings and the purchase of machinery is under consideration

by the Government on the same basis as the relief given for investment in industry at present. Foreign exchange necessary for capital equipment, machinery, fertilizer and agro chemicals will also be made available to the private sector. The Government has approved the setting up of a Special Leases Board consisting of the Permanent Secretaries of the Ministries of Land, Irrigation and Power and Agriculture and Food as well as the Heads of the Departments of Irrigation, Agriculture, Land, Planning, Forest, etc. to look into the applications received from the private sector and to make recommendations to the Hon. M L. I. & P. About 10,000 acres have already been leased out to the end of December, 1965. The programme of leasing of land for the plan period depending on the applications received will be about 30,000 acres per annum. It is expected that the investment by the private sector on agricultural development and the opening of new land while providing avenues for employment of a large number of people will also contribute substantially towards a saving in foreign exchange by cultivating substitutes for food articles imported at present.

CHAPTER XI

SURVEYS

Most of the work of the Survey Department is organised on a programme of survey decided upon at an annual conference. The requirements of the Settlement Officer for surveys for the settlement of claims to land and of the Director of Irrigation for surveys for the design of reservoirs, dams, channel traces etc., to provide irrigation facilities are very precisely and clearly set out. Adequate staff has always been assigned for these surveys. This has resulted in nearly all the work undertaken being surveyed according to programme. Nearly all the plans of survey for settlement of claims to land have been printed and issued without much delay but there has been a delay of three to four years in the issue of prints of Engineering Surveys. This delay has since been remedied and it is very likely that we will very soon be able to issue prints of each year's Engineering survey during the following year. Prints of some of the 1964 Engineering surveys have been issued in 1965.

2. Sporadic surveys consist mainly of surveys for blocking out of land into small parcels of one or two acres each for alienation to peasants and surveys of improved allotments for the issue of title grants to allottees. We also have a small amount of surveys for the acquisition of private land for various development purposes, in this category of surveys. Requests for these surveys are received from the Government Agents all round the year and, as much of this work as possible is done with the staff assigned for this purpose. While the volume of work done each year has increased with the increase in the cadre of Surveyors, the demand for surveys has out-stripped the increase in work to be done.

3. We shall have over 500,000 acres of land given out under the Land Development Ordinance for which title grants have not been issued as yet. The rate of survey is only 30,000 acres per year and we will need over 15 years to clear the arrears alone. Other departments like the Irrigation and Land Development are likely to increase the tempo of land development and this will result in further alienation of land and consequently a greater need for surveys. We have in the past met such demands by increasing our cadre but in a department whose personal emoluments bill exceeds 85% of the total expenditure it is worth considering whether we are making full use of our man power.

4. It is generally felt that the existing system of Surveyors working as single units from individual camps is out-moded and not conducive to high efficiency and that very much more work could be done by the same staff with the same survey equipment if the surveyors on Sporadic Surveys worked from Central camps travelling to work. It is therefore proposed to increase the Motor Vehicles strength from the present all-round strength of one vehicle for every 35 surveyors and 300 men to one vehicle for every 10 surveyors and 80 men and if successful to even one vehicle for about every 5 surveyors and 40 men.

5. Another problem connected with Sporadic Surveys is the inordinate delay in the issue of prints of completed plans. This has resulted in our outstandings being very high. We have recently streamlined survey procedures on Sporadic Surveys and decentralised the control so that Divisional Superintendents of Survey could deal direct with the Government Agents. Attempts are being made to prepare annual programmes for Sporadic Surveys in each district so that the Government Agents and the Heads of Government Departments may know when they could expect prints of plans. These, with the recent transfer of plan examination to source, will expedite the issue of Sporadic plans and reduce arrears. It is hoped to reduce the present lag of three to four years to about an year for ordinary requisitions and a few months for urgent requisitions.

6. For this new procedure to be effective it is necessary to establish a Divisional Survey Office in every district. preferably in close proximity to the Kachcheri. Once these are established it will be possible to hold all the plans and documents relating to survey of Crown Lands in the district in the Kachcheri Town and even take over the custody of the Kachcheri Plans. Most of the Government Agents who were consulted, welcomed this suggestion, as it will ensure that Kachcheri Land Records will be properly kept and made available for issue to revenue officers when necessary. Survey work too will run faster and smoother, as all old documents required by the Surveyors will be available in the divisional office. Establishing these Divisional Offices will need funds for the construction of the Divisional Offices, quarters for the Divisional Superintendents of Surveys and Quarters for the Staff. The work could be spread over a number of years.

7. The following is a table indicating the work done on Engineering Survey, Block (Settlement) Surveys and Sporadic Surveys during the past five years.

EXTENT IN ACRES

	1960 *Acres*	*1961* *Acres*	*1961/62* *Acres*	*1962/63* *Acres*	*1963/64* *Acres*
Reconnaisance Engineering Surveys	33,350	—	117,140	75,640	127,460
Close Contour Engineering Surveys	138,270	176,072	188,780	221,735	152,788
Village Tank Engineering Surveys	5,270	3,400	15,195	23,385	12,150
Channel Tracing (Miles)*	261	165*	275*	226*	350*
Block (Settlement) Surveys	34,965	57,600	38,675	29,810	41,665
Topo (Settlement) Surveys	322,590	329,045	166,293	212,795	122,272
Ordinary requisitions	41,216	7,690	18,288	23,961	14,495
Acquisitions Surveys	4,067	4,487	4,254	6,157	4,356
Blocking out Major Surveys	43,068	32,052	18,788	41,484	65,798
Blocking out Village Expansion Surveys	27,020	16,567	18,464	45,868	72,270
Survey for grants	19,401	27,747	32,820	34,180	36,130

8. Town Surveys have been on the department's programme for several years but the progress has been very slow. Arrangements have been made recently to break this work into parts and do it on the basis of a well organised annual programme. This will ensure that target dates are kept. Establishment of central camp for these Surveyors too, will increase efficiency considerably. As we cannot meet the requirements of the Town Planner with ground survey methods for a number of years, arrangements have been made to prepare rectified enlargements of aerial photographs at scales large enough for his work. Some of the towns have been flown and others will be done shortly.

9. The following is the progress made on Town Surveys during the last five years.

TOWNS

Year taken up	*Name of Town*	*Total Extent in Acres*	*1960*	*1961*	*1962*	*1963*	*1964*
1954	Polgahawela	745 Acres	Field work completed plans being drawn in recess	—	—	—	—
1957	Ratnapura	2,632 (Revision)	315	185	Work completed and plan work in progress	—	—
		1,457 (Extension)	705	520	165	Field work completed and plan work in progress	—
1957	Kolonnawa	1,305	753	470	Field work completed and plan work in progress	—	—
1957	Moratuwa	3,247	777	613	511	421	239
1959	Jaffna (Revision)	4,500	342	517	333	909	703
	Colombo (Revision)	—	166	—	105	175	449
1961	Panadura	1,144	—	—	765 (SK)	144 (SK)	52½ (SK) 658 (Assmt.)
1961	Trincomalee	1,900	—	310 (SK)	830 (SK)	50 (Assmt.)	996 (Assmt.)
1961	Galle	3,500	—	—	1,192 (SK)	1,415 (SK)	855 (SK) 140 (Assmt.)
1963	Anuradhapura (Revision)	7,300	—	—	—	217	2,235

10. The following is a list of Town Surveys which have to be done in the near future.

(1) Dehiwela-Mt. Lavinia
(2) Badulla
(3) Batticaloa
(4) Negombo
(5) Ambalangoda
(6) Vavuniya
(7) Hatton-Dickoya
(8) Kegalle
(9) Weligama
(10) Chilaw
(11) Puttalam
(12) Beruwala
(13) Nawalapitiya
(14) Gampola
(15) Gampaha
(16) Tangalla
(17) Chankanai
(18) Maharagama
(19) Mulativu
(20) Hambantota
(21) Talawakelle-Lindula
(22) Mannar
(23) Kadugannawa
(24) Avissawella
(25) Wattegama
(26) Teldeniya
(27) Beliatta
(28) Kattankudi
(29) Mirigama
(30) Homagama
(31) Piliyandala
(32) Elpitiya
(33) Eravur
(34) Punduloya
(35) Matugama
(36) Kalmunai
(37) Yatiyantota
(38) Wadduwa
(39) Kalutara
(40) Wattala-Mabole
(41) Matale
(42) Battaramulla-Talangama

There is very little hope of our completing this programme in the near future unless the staff assigned for Town Survey is increased considerably.

11. The Topographical Survey of the Island at One Inch to One Mile Scale was completed in 1924. These sheets were at first revised regularly but with the increasing demand to development surveys the staff assigned for revision had to be reduced and many of the sheets are out of date. The progress of One Inch Topo revision in recent years is as follows :—

1961—Kalkudah

1962—Vakeneri, Rukam, Maha Oya

1963—Nilgala

1964—Kataragama, Westministers Abbey

1965—Ambalantota completed and Hambantota, Paname, Marichchikeddi, Timbolketiya, Puttalam, Buttale and Madawachchiya under revision.

Even when the 1965 programme is completed we will have several sheets which have not been revised in the last 20 years. On account of the vast sums of money being spent by Government in developing the under-developed areas and in setting up new institutions and projects it is very necessary to provide adequate staff to revise the whole island at the One Inch to One Mile scale every five years.

12. We have in the past particularly in the period 1921 to 1935 surveyed several towns and prepared Town Maps. These have except in a few cases remained unrevised and now serve little purpose. A specification has been prepared for a Town Guide Map Series but hardly any progress has been made, as this work has been put aside on account of other urgent work, especially work connected with the development of land. This state of affairs cannot be permitted to continue and staff and equipment will have to be provided in the near future for this work.

13. An attempt was made several years ago to provide a National Map at the Five Inches to One Mile Scale to serve as a preliminary map for study and planning of development. Very little progress has been made on this project, largely due to the shortage of Process Draughtsmen and the inadequacy of short run printing machines. One more new Duffa Proof press is under installation and when it comes into operation it may be possible to clear some of the accumulated work but more scribing equipment and more Proof presses will be needed if we are to cover the entire area that will be developed in the near future.

14.. The demand for all categories of surveys has increased three-fold in the last ten years. The number of field surveyors was increased to meet this demand but the demand exceeded the capacity of the increased staff and it was the application of the Air Survey method that made it possible to supply the necessary maps and plans. Mapping by this method averaged over 400,000 acres annually since 1962 while the extent mapped in 1965 totalled 2,586,480 acres. Of this extent 2,264,520 acres of mapping was done for the feasibility studies of the Mahaweli Basin Development Project and the work was completed within the specified time schedule of 4 months. The magnitude of this task could be appreciated by a comparison with what it would have cost to have the work done abroad. Two companies who were requested to contract for this work quoted $70 per square mile for plotting only without supply of final prints, and this would have cost the Government Rs. 1,177,550. Besides they required nearly a year to complete the plotting.

Some of the other fields in which air photographic methods have accelerated progress are :—

Geological Surveys.—Tectonic mapping of Panadura-Horana, Ambalangoda, Wariyapola, Rakwana, Kurunegala, Galgamuwa, Ratnapura, Nalanda, Avissawella, Alutgama, Dambulla and Kandy 1" sheet incorporation in the Geological maps of the areas were done for the Director of Geological Surveys.

Forestry.—Inventory mapping of Wasgamuwa, Bintenne, Mavillu-Veppal, Eratne, and Gilimale forest for proposed forest reserves for extraction and management planning by the Conservator of Forests.

Engineering.—Highway planning between Alutnuwara-Padiyatalawa, Palupana-Yodakandiya, Kataragama-Buttala-Yala, Kehelana-Deepdene, Weddagala-Thinniyawela, Dankotuwa-Pusgoda, Tanamalwila-Uda Walawe, Rajawaka-Samanalawewa, Colombo-Katunayake for road construction.

Annotated mosaics showing drainage and other information have been supplied for various purposes, such as salvinia eradication, fisheries harbour construction studies. Some of the spheres in which Air Surveys can effectively contribute to the development programme of the country are :—

(i) Production of a National Map Stores on the 5" scale with 20-foot contours to augment the existing 1" topographical series and provide the base for any future feasibility studies for development planning (about a quarter of this work has already been done but as will be shown later, map-printing has been a bottleneck).

(ii) town surveys where conventional methods alone have been very slow and a backlog of nearly 30 towns have accumulated. Tests for the integration of Air Survey methods have shown very satisfactory results.

(iii) survey of improved allotments for issue of L. D. O. grants where there is a heavy backlog of work resulting in loss of revenue and hardship to all others.

15. The demand for surveys for development has been so great during the last two decades, that our programmes have been prepared to meet as much of this demand as possible. This has resulted in normal map series work like the revision of the One Inch to One Mile topographical series, revision

of town maps, land utilization maps, estate maps, etc., being put aside. The new five inch to one mile National Map Series did not have a chance to make any head way. Our National Atlas and Town Guide Map are still in the making.

16. Survey programmes should anticipate the requirements of other departments and have maps and plans ready when needed. Our programmes should be a fair way ahead, so that other departments will not be held up for want of plans. To achieve this our output should increase considerably.

17. For this purpose it is proposed to increase our staff as follows during the next three years :—

Item	*1966/67*	*1967/68*	*1968/69*
Superintendents	2	2	2
Assistant Superintendents	10	10	10
Surveyors	100	100	100
Drivers	50	25	25

This increase in staff, providing adequate transport, and establishing of divisional Survey Offices in Kachcheri Towns, will require the following capital expenditure :—

Items	*1966/67*	*1967/68*	*1968/69*	*1969/70*	*1970/71*
Transport Vehicles (Foreign Cost)	650,000	400,000	400,000	400,000	400,000
Building and Stores	300,000	300,000	300,000	300,000	300,000
Furniture	50,000	50,000	50,000	50,000	50,000
Field Equipment (Foreign Cost)	800,000	800,000	800,000	—	—
Printing Machinery (Foreign Cost)	—	160,000	160,000	—	—
	1,800,000	1,710,000	1,710,000	750,000	750,000

18. The recurrent expenditure during the last fifteen years has worked out each year to about Rs. 30,000 per Surveyor. The requirements in staff and capital expenditure have been based on a proposed expansion from the present 720 Surveyors at about 100 Surveyors per year to 1,000 Surveyors per year at the present rate. This will represent an annual recurrent expenditure of about Rs. 30,000,000.

19. With the establishing of Survey Offices in Kachcheri Towns, changing our field organization to work from Central camps and with the provision of transport to Surveyors, it is very likely that besides reducing the recurrent expenditure to about Rs. 25,000 per Surveyor per year, we may be able to make an appreciable increase in the out-put per Surveyor per year and thus provide Government with a very much better survey service than at present.

DEVELOPMENT OF FOREST RESOURCES

1. Background

Of the total land area in Ceylon of 16,228,230 acres 7,164,710 acres are forest. Thus forests cover approximately 44% of the land. These figures are from a survey made in 1960 based on aerial photographs taken in 1956. From aerial observations made this year in the Wet Zone it appeared as if there has been a 10–15% reduction in the forest area. The reduction is likely to be greater in the Dry Zone. Thus if the total forest area has been reduced by 15%, the forest cover at present could be considered to be between 35 and 40%.

The distribution of the forest area according to Zones is as follows :—

	Area of Forest
Dry Zone	6,197,790
Wet Zone	562,270
Intermediate and Montane Zones	354,830

These forests contain according to the last inventory about 4,500 million cubic feet, and produce annually a harvestable increment of over 30 million cubic feet. These figures include all species, some of which are not used at present. As an example, Wira, which is used only as firewood comprises nearly 1,000 million cubic feet of the total timber volume in the Dry Zone of about 3,000 million cubic feet.

Except for the Wet Zone forests the rest of the Natural Forests in the Island are poorly stocked, particularly if only utilisable species are considered. In view of this it is essential to have a programme of reforestation. An accelerated programme was initiated about 5 years ago and the Forest Department now manages over 60,000 acres of plantations, of which more than 20,000 acres are Teak plantations in the Dry Zone.

A summary of the planted extents is given below :—

Species	*Area*	*Location*
Teak	21,564	Dry Zone
Eucalyptus	11,835	Montane Zone
Jak/Mahogany	11,931	Intermediate Zone
Mahogany (lines)	12,031	Wet Zone
Casuarina	305	Dry Zone
Nedun (lines)	942	Wet Zone
Softwoods	216	Wet Zone
Miscellaneous	2,350	—
Total	61,174 (as at 30.9.1964)	

2. Encroachments

In the last 10 years the extent of illicit clearing and encroachments on Crown Forests has been steadily increasing. In the Wet Zone this is largely due to population pressure while in the Dry Zone the habit of Chena cultivation contributes towards illicit clearing. Several Forest Reserves in the Wet Zone have been released following on heavy encroachments e.g., Uragaha Proposed Forest Reserve 3,873 acres were released due to encroachments and in Kottawa-Kombala Proposed Reserve an extent of 1,072 acres had to be released.

3. Development

(*a*) REFORESTATION

Planting of Forest trees has been done in Ceylon since the eighteen seventies. Teak was one of the first species to be planted and it still holds a predominant position in the planting programme of the Forest Department. Subsequently, Mahogany, Jak, Eucalyptus, Cypress and various other species began to be planted. In the early days, however, planting was necessarily experimental and there was no planned programme of reforestation. Organized planting started in the nineteen twenties and by the nineteen thirties large extents were being planted with Teak, Mahogany, Jak and Eucalyptus. Unfortunately, the last war caused a slow down of planting—all the energies of the Forest Department being concentrated on timber supplies for war purposes. Interest in planting was renewed after the war but an organized programme received its first real impetus from the 3-year implementation plan. It is from this period onwards that the large extents which were necessary began to be planted. In the last few years these extents have been considerably increased as the figures below show.

PROGRESS OF REFORESTATION—1955/1965

Year	*Teak Acres*	*Eucalyptus Acres*	*Miscellaneous Acres*	*Softwood Acres*	*Mahogany Acres*	*Bamboo Acres*	*Total Acres*
1955	681	496	309	—	20	—	1,506
1956	578	579	449	—	305	—	1,911
1957	664	560	1,073	—	360	—	2,657
1958	430	225	573	—	698	—	1,926
1959	1,108	367	359	—	1,909	—	3,743
1960	2,729	728	479	—	2,946	—	6,882
1961	1,930	958	239	—	3,232	—	6,359
1962	3,597	615	219	—	2,332	—	6,763
1963	3,602	535	189	75	2,395	—	6,796
1964	5,646	977	185	577	3,038	90	10,513
1965	6,736	1,214	617	—	4,135	—	12,702
Total Acres	27,701	7,254	4,691	652	21,370	90	61,758

The extent of land taken up for development annually is approximately 100,000 acres, the bulk of which falls within the Dry Zone. Approximately, one million acres would be taken up for development during the 10-year period 1958/1968 and it is essential to compensate for the loss of timber on this land. Since the timber value of one acre of forest plantation in Teak or Eucalyptus is equivalent to that of 30–40 acres of the type of natural forest being cleared for development, a minimum reforestation programme of 10,000 acres annually should compensate for the loss of timber from the land coming under development. The extent reforested by the Forest Department in 1965 was 12,702 acres of all species, which exceeds this minimum requirement, and an annual target of 13,000 acres has been assigned for the next five year period.

In the early days of planting not much attention was paid to the utilization of the timber produced from plantations. The accent was on improving the condition of the natural forests and hence the Dry and Montane Zones received the greatest amount of attention. Teak, which was planted in the Dry Zone is a world-renowned timber, but Eucalyptus which was planted in the Up-Country was meant to be used for firewood and Mahogany was actually introduced to this country as a potential source of Tea Chests.

Today's attitudes are different. Teak still holds a predominant position due to the unique qualities of its timber, but the accent now is to supply consumer needs—particularly the needs of industry. In the past no planting of softwoods and matchwoods was done. As a result there is a serious shortage of these timbers which has to be met. Due to past neglect, all the pioneering work has also got to be done and very quick progress cannot be expected. The techniques of reforestation in the Wet Zone are quite different to those in the Dry and Montane Zones and there is no past experience in the Wet Zone to serve as a guide. Softwoods for the packing case industry and matchwoods, have to be raised in the Wet Zone and experience in this area is being gradually acquired.

It also becomes necessary now to raise plantations to meet special needs. One example is the newsprint project which needs timber from 15,000 acres of Eucalyptus plantation to produce the expected annual output. Intensive experimenting is also going on with Bamboo planting because this is a potential source of pulp. Thus in future, it is likely that industrial needs will decide as to the species which will be plan ed. So far the Plywood Factory depends on timber from natural forests. This is one of the disabilities under which the Plywood Factory labours. It is difficult to run an industrial undertaking when there is much variation in the quality of the raw material and it is very likely that in the future, planting of favoured species for the Plywood Factory will have to be done.

It is not generally realised that Ceylon is one of the most crowded countries in Asia. Countries like Burma, Indonesia and Malaya can depend on the relatively small increment from natural forests, but Ceylon cannot. Here it is vitally necessary that the maximum use be made of scarce land resources and forestry cannot be an exception. The increment of natural forest in the Dry Zone is 4–16 cubic feet per acre per year and in the Wet Zone 16–95 cubic feet per acre. An Eucalyptus plantation on a good site can yield as much as 300 cubic feet per acre per year for the expenditure of a relatively small sum of money. This illustrates the enormous increase in productivity per acre that can be obtained from plantations. In the case of Teak it must be realised that the Forest Department's selling price is about one-third of the price of Burma Teak imported into this country.

2.5 million rupees worth of foreign exchange was spent in 1964 on inport of Burma Teak. As against this the provision for reforestation in the current estimates is only 1.5 million rupees and this includes all planting—not only Teak.

A certain amount of background information has become necessary because it is generally thought that investment in reforestation is a long range aim which contributes nothing to immediate needs. However, the expansion of transmission pole supplies is expected to be entirely met from plantations and the Newsprint mill is expecting to carry on for the first few years from existing plantations. The Newsprint mill at this site could not have even been considered if not for the Eucalyptus plantations already existing. It is also not true that forest plantations yield a return only after decades or centuries. In the case of the newsprint project the planting rotation is only about 10 years. Generally the question of how to produce timber which is needed for industry comes to be considered only when industry is starved of raw material. It would be more logical to anticipate the needs of industry and make provision for it instead of waiting for a crisis.

The progress of reforestation by species and divisions during the last 10 years has been as follows :—

1955

	Teak	*Eucalyptus*	*Misc.*	*Mahogany*	*Total*
Eastern Division	133	—	—	—	133
North Western Division	285	—	309	—	594
North Central Division	100	—	—	—	100
Western Division	100	—	—	—	100
Southern Division	35	—	—	20	55
Northern Division	28	—	—	—	28
Up-Country Division	—	497	—	—	497
	681	497	309	20	1,507

	Teak	*Eucalyptus*	*Misc.*	*Mahogany*	*Total*
1956					
Eastern Division	100	—	—	—	100
North Western Division	230	—	437	—	667
North Central Division	81	—	—	—	81
Western Division	30	—	—	305	335
Southern Division	35	—	12	—	47
Northern Division	50	—	—	—	50
Up-Country Division	52	519	—	—	571
	578	519	449	305	1,851
1957					
Eastern Division	75	—	1,073	—	1,148
North Western Division	339	—	—	60	399
North Central Division	—	—	—	—	—
Western Division	70	—	—	265	335
Southern Division	80	—	—	35	115
Northern Division	100	—	—	—	100
Up-Country Division	—	560	—	—	560
	664	560	1,073	360	2,657
1958					
Eastern Division	25	—	—	—	25
North Western Division	200	—	573	352	1,125
North Central Division	60	—	—	—	60
Western Division	25	—	—	—	25
Southern Division	80	—	—	346	426
Northern Division	40	—	—	—	40
Up-Country Division	—	225	—	—	225
	430	225	573	698	1,926
1959					
Eastern Division	359	—	—	—	359
North Western Division	447	—	359	668	1,474
North Central Division	125	—	—	—	125
Western Division	—	—	—	705	705
Southern Division	100	—	—	536	636
Northern Division	77	—	—	—	77
Up-Country Division	—	367	—	—	367
	1,108	367	359	1,909	3,743

1960

	Teak	*Eucalyptus*	*Misc.*	*Mahogany*	*Total*
Eastern Division	464	—	—	—	464
North Western Division	743	—	14	935	1,692
North Central Division	1,020	—	—	—	1,020
Western Division	100	—	365	1,100	1,565
Southern Division	219	—	—	911	1,130
Northern Division	148	—	100	—	248
Up-Country Division	35	728	—	—	763
	2,729	728	479	2,946	6,882

1961

	Teak	*Eucalyptus*	*Misc.*	*Mahogany*	*Total*
Eastern Division	620	—	—	—	620
North Western Division	742	—	94	868	1,704
North Central Division	348	—	—	—	348
Western Division	60	—	—	1,464	1,524
Southern Division	—	—	25	900	925
Northern Division	—	—	105	—	105
Up-Country Division	150	958	15	—	1,123
	1,920	958	239	3,232	6,349

1962

	Teak	*Eucalyptus*	*Misc.*	*Mahogany*	*Total*
Eastern Division	822	—	—	—	822
North Western Division	831	—	10	422	1,263
North Central Division	187	—	—	—	187
Western Division	200	—	—	1,485	1,685
Southern Division	1,375	—	75	425	1,875
Northern Division	—	—	82	—	82
Up-Country Division	150	615	52	—	817
Vavuniya	32	—	—	—	32
	3,597	615	219	2,332	6,763

1963

	Teak	*Eucalyptus*	*Misc.*	*Softwoods*	*Mahogany*	*Total*
Eastern Division	825	—	14	—	—	839
North Western Division	830	—	—	—	500	1,330
North Central Division	190	—	—	—	—	190
Western Division	200	—	75	75	1,422	1,772
Southern Division	1,380	—	—	—	473	1,853
Northern Division	—	—	75	—	—	75
Up-Country Division	150	535	25	—	—	710
Vavuniya	28	—	—	—	—	28
	3,603	535	189	75	2,395	6,797

1964

	Teak	*Eucalyptus*	*Misc.*	*Bamboo*	*Soft-woods*	*Mahogany*	*Total*
Eastern Division	1,279	—	—	90	—	—	1,369
North Western Division	1,713	—	5	—	100	376	2,194
North Central Division	748	—	—	—	—	—	748
Western Division	245	—	—	—	282	1,650	2,177
Southern Division	929	—	—	—	190	1,012	2,131
Northern Division	—	85	160	—	—	—	245
Up-Country Division	400	871	20	—	—	—	1,291
Vavuniya	332	—	—	—	5	—	337
	5,646	956	185	90*	577	3,038	10,492

* Complete failure.

During the last ten years the extents planted in Teak and Eucalyptus and Conifers in the Montane area has been considerably increased. However, the extents planted with matchwood and other softwood species had to be considerably reduced. This is due to the non-availability of funds. The departmental estimate to undertake the entire reforestation programme was in the region of Rs. 2.4 million. However, the funds allowed have been in the region of Rs. 1.5 million.

Teak which is grown on a Co-operative basis, is a most valuable species and plantations can be established most successfully. An acre of Teak plantation can be established for Rs. 70. In addition it is estimated that the value of food crops raised in 6,000 to 7,000 acres of Teak annually is well over Rs. 1 million in the final year alone.

As against this matchwood and other soft wood species have to be raised departmentally and the cost of maintenance and establishment are much higher. To establish an acre of these species would cost approximately Rs. 600 per acre as against Rs. 70 for Teak.

There has been no alternative but to curtail, the matchwood and other softwoods planting programme.

(*b*) TIMBER SUPPLIES

During the period referred to above all timber requirements of Government Departments and a major part of the timber requirements of the public has been met by the Forest Department. The chief timber consuming Departments have been the Railway, Plywood Factory, Harbour Engineer, National Small Industries Corporation, Government Factory, Prisons, etc. A tabulated statement of supplies made over the last 10 years appears on page 181.

Annual Timber Supplies

The average annual supply of timber by the Forest Department over the last 10 years has been gradually increasing and now stands at the figure of 6.3 million cubic feet, although the total consumption figure at present for the whole island is 11.7 million cubic feet. About 2.5 million cubic feet of timber in various forms have been annually imported and the private sector has contributed to the production of approximately 2.9 million cubic feet annually. The bulk of the imports comprising 2.5 million cubic feet has been mainly in the form of Tea Chests, Burma Teak and Pine Board.

Necessity for Mechanisation of logging

Before timber is supplied as a semi-finished product in the form of sawn timber, logging operations have to be carried out in the forest. The methods of logging in the past have been very primitive, and this has been one of the chief drawbacks to high output of timber. Felling and sizing of logs has been done mainly using the axe and handsaw, and haulage of logs has been by animal power, mainly elephants and bullocks up to a motorable road. From there onwards transport has been by lorry or rail, up to the centres of consumption. To cope with the increase in demand for timber and to complete exploitation in lands released for development, efforts have been made to induce contractors to launch out on mechanisation. Some contractors responded to this call by using Farm tractors and cranes. However, as the impact of this mechanisation was not significant in stepping up production and as the mechanised equipment used was not always suitable it became necessary to seek the assistance of the United Nations in 1963 to propose a practical scheme of mechanisation in logging to be extended to all the different forest types in the country.

Mechanisation of sawing

Besides mechanisation of haulage of logs it was found that the saw milling capacity was grossly inadequate to meet the demand of all sawn timber required, particularly in the building and carpentry industries. Up to about 1958 all sawing was done on contract at saw mills operated by various contractors. About 15 saw mills were in operation, but most of these had out-dated machinery resulting in poor cut-turn and an unsatisfactory finished product. 3 modern Band-saw mills capable of converting about 400-500 cubic feet of sawn timber per day were installed departmentally in 1960/61. 6 Portable saw mills capable of erection in the heart of the forest were also purchased departmentally and put into operation. A further two such portable saw mills will be put into operation in the current financial year.

Use of inferior timbers

In about 1960 a timber resources survey was carried out by a Canadian team and their investigations show a potential annual yield of 30 million cubic feet of timber of all types, as available in the country. If this quota of timber is harvested we would be self supporting in timber, and sufficient timber would be available even for export.

The bulk of this 30 million cubic feet of timber however is very inferior timber which has to be seasoned or treated with preservatives prior to use. Some timbers such as Wira cannot be utilised in its natural form—these will have to be processed and converted into wood products such as chip board.

To utilise the inferior timbers after preservative treatment an Impregnation Plant was set up at Boosa in 1954. As this plant was inadequate action was taken in 1963 to call for tenders for the erection of a second Impregnation Plant in Colombo.

For the seasoning of timber prior to use a Seasoning Kiln with a capacity of 200 cubic feet was installed at Boossa and action has been taken to instal a further 5 such kilns.

Supply of Sleepers to the Railway

There are at present about 800 miles of Railway line, each mile requiring about 2,500 sleepers. On an average life of 10 years per sleeper, 200,000 sleepers are required annually for replacement. Due to inadequate exploitation and sawing facilities referred to earlier it has been possible to meet only about 75% of this supply.

Plywood supplies

The Plywood Factory at Gintota presently produces only about 20% of the Island's requirements of Tea Chests. The balance 80% is imported from Japan, Russia and Finland at a cost of about 15 million rupees. To produce the 20% of the Island's requirements the Forest Department supplies annually about 600,000 cubic feet or 2,000 cubic feet per day. When the Plywood Factor commenced production in 1943 the total output was insignificant and the daily supply of logs to the factory was about 500 cubic feet per day. Over the last 10 years log supplies were increased to 2,000 cubic feet per day. This increase was achieved mainly by experimentation with a larger number of species. About 25 species of inferior timber from the Wet Zone forests are used today as against about 5 when the factory first went into operation.

Matchwood supplies

3,000 cases of match boxes are turned out monthly in Ceylon. Each case contains 7,200 boxes. On this basis 24,000 cubic feet of logs are required monthly for the match industry or approximately 300,000 cubic feet of logs annually.

Since specific qualities are required for timber used in match manufacture the number of species that could be used is limited. Until about 1960 only 3 species of timber were used for match manufacture. With greater liaison between the match industry and the Forest Department the industry today uses about 10 species of timber. Large quantities of logs were supplied from 1963 onwards by the Forest Department at a concessional rate, to give a fillip to this industry.

Carpentry Industry

Besides the private sector engaged in carpentry work, several Government institutions such as the National Small Industries Corporation, Department of Rural Development and Cottage Industries and the Prison Department have been actively engaged in furniture manufacture. Up to about a million rupees worth of timber is supplied to the N. S. I. C. alone annually. About 100 registered carpenters are also issued with a monthly quota of good quality timber from a Departmental Depot at Moratuwa.

Up to about 1958 almost all furniture manufacturers turned out our furniture out of Burma Teak and Satin wood. Due to the high foreign exchange involved in the import of Burma Teak and as Luxury timbers such as Satinwood were to be reserved for export, about 8 other suitable local timbers were introduced for furniture manufacture a few years back.

(*c*) MINOR FOREST PRODUCE

Minor Forest Produce includes all forest produce other than timber. The importance of this aspect of Forestry was not felt until recently when it was found that several millions of rupees were spent in foreign exchange in the import of various items of minor forest produce locally available in Crown Forests.

With a diverse flora characteristic of tropical regions a wealth of minor forest produce is available in our forests. These could be grouped into the following categories :—

(*a*) Distillation and extraction products which include leaf oils, wood oils and various grass oils.

(*b*) Tans and dyes—from leaves, barks and fruits.

(*c*) Grasses, bamboos and canes.

(*d*) Gums, resins and oleo—resins.

(*e*) Fibres and flosses

(*f*) Animal products.

(*g*) Medicinal herbs.

(*h*) Special purpose leaves such as Beedi leaves.

Until 1964 apart from sporadic investigations no work was done in the field of minor forest produce. Since 1964 the following investigations were undertaken :—

Beedi Leaf

About 7.2 million pounds of Beedi leaf are imported annually from India at a cost of about 6 million rupees. A resources survey was made of areas where the Kadumberiya plant occurs naturally and several thousands of acres were located in the Bibile and Mahiyangana electorates. The technique of curing the leaf was passed on to the local residents in these areas and today the collection of beedi leaf is a thriving cottage industry in these two electorates.

Wattle Bark for Tannin

About 500 tons of wattle extract are annually imported at a cost of 0·5 million rupees. A feasibility study was made of the use of dried bark of the wattle plant for tannin extraction. Sufficient raw material is available in the Up-Country plantations to start this project. The information was passed on to the Leather Corporation which is now in contact with an Australian Expert assisting the tannery expansion project of the Leather Corporation.

Other investigations

Several other investigations have also been made on the availability of medicinal herbs, Ekaweriya, Venivelgeta, Aralu, Gammalu, Nux-vomica seed, etc. with a view to promoting an export market for some of these products.

4. Drawbacks

(*a*) ROADS

One of the more serious problems facing the Forest Department in its exploitation programme was the lack of roads. In the past only existing roads were used and no roads were built especially to assist exploitation. This was particularly true in the Wet Zone where the cost of road construction is high. The net result of this was that accessible forests tended to be over exploited while the more distant inaccessible areas remained untouched. From about 1960 a programme of road construction was initiated but unfortunately the provision in the annual estimates for this work has been steadily decreasing. In the first year of the programme Rs. 250,000 was set apart for the construction of 10 miles of road. This money could not be fully spent because a special road building unit had to be set up and experience gained in this work. In subsequent years the provision was reduced, till in the current year only Rs. 40,000 has been provided. This amount is not enough even to build 2 miles of road in the difficult terrain of the Wet Zone and thus there is hardly any impact on the problem. An increase in output is not possible unless roads are built into the inaccessible areas. Even in the accessible areas road building will reduce the strain on the forest extraction organisation, as lorries would be taken closer to the felling sites.

(*b*) EQUIPMENT

Another serious handicap has been the fact that we are so dependant on elephants and sling carts for forest extraction. The number of elephants available for forest extraction work is limited and cannot be easily increased. Thus the volume of timber which can be extracted from the forests of the island is limited. Forest exploitation is done in this country through the medium of contractors who work on relatively short term agreements. There has thus been no financial incentive for them to mechanise their operations since machines for this purpose are expensive and their costs cannot be recovered during the period of these short term agreements.

The net result of this policy has been that contractors use extraction methods that demand little capital and these methods are usually slow. In view of these reasons there is no alternative but for Government to enter the field of logging and extraction.

(c) ORGANIZATION

The general organization of the Forest Department has been more or less static since its inception. After the last War, when the responsibility of supplying timber and firewood to Government Departments and the Public was undertaken, the only organisational change was the establishment of timber depots and the provision of Forest Overseers, Checking Officers and so on. It is doubtful whether a business such as the retail selling of timber and firewood to the value of about 20 million rupees annually can be done within the rigid framework of a Government Department, where correct procedure is valued more than high performance. If profit and loss were important criteria there is no doubt that a road building programme and mechanisation would have started much earlier. Also extreme parsimony in providing buildings and staff has contributed to slow development. It is apparent now that some change in the organisational set up is necessary if the full potential of forestry in this country is to be harnessed.

5. Pre-investment Survey

Realising the short comings under which forest development was labouring, a request was made to the United Nations for Special Fund aid to undertake a Pre-investment survey of Forest Industries Development. The objects of this project were as follows :—

> " to assist the Government of Ceylon in the rational development of its forest industries sector by evaluating the immediate possibilities for establishing selected industries and by providing the necessary planning for the long-term development of forest industries based on sustained forest resources. "

In order to achieve these objectives, it was necessary :—

(i) to carry out economic and technical feasibility studies of specific forest industries in selected locations ;

(ii) to train Forest Department personnel in the evaluation and planning of forest industries projects and in modern methods of forest production, extraction and utilization, and

(iii) to prepare suitable management plans to ensure the long term development of forestry and the forest products industries in Ceylon.

The project commenced operations in May 1964. Unfortunately all the staff required for the project did not arrive at the beginning and hence progress in certain fields has been held up. Much progress has been made however with mechanising logging and extraction operations and at the present time work is going on using mechanised methods. This work is something quite new to Ceylon and it was thus necessary to start off on an experimental basis. Accordingly not only were many different types of equipment tested but even different makes of the same equipment. It can be now considered an established fact that forest operations can indeed be mechanised but due to the very nature of the present project its economic feasibility cannot be conclusively demonstrated. Other aspects of this project deal with Forest Industries, Forest Inventory and management and timber seasoning and preservation. During the balance 18 months of the project a Wet Zone forest inventory would be completed, the full range of forest operations from felling a tree to delivery at a consuming centre would be mechanised, timber seasoning and preservation would be stimulated and information would be made available regarding the industrial potential of Ceylon's timbers.

6. Requirements of Forest Products over the next 5 years

With the increase in activity in the Industrial sector several industries have been recently set up requiring timber as a raw material e.g., manufacture of boats, brush handles, pencils, battens, sports goods, toys, etc.

Feasibility studies and project reports have also been made to Government on the establishment of some major industrial projects requiring large quantities of timber e.g., newsprint manufacture, and the steel rolling industry. Several hundreds of tons of timber will be required daily for the production of pulp for the newsprint mill at Ambawela and for the production of charcoal in the final stage of the steel rolling project.

Amongst the existing industries too, expansion is underway. The Plywood Industry, for instance, which needs only 0·6 million cubic feet of logs per annum at present is being reorganised to double its output next year. As a result of this 1.2 million cubic feet of timber will have to be supplied to the Plywood Factory from next year. Even with this expansion only 40% of the Island's requirements of plywood will be manufactured. Feasibility studies are also being made for the establishment of a second Plywood Factory to meet a further 20% or 40% of the Island's requirements.

In the furniture industry too there are signs of rapid expansion. To meet the entire requirements of furniture for schools, hospitals, etc. the National Small Industries Corporation proposes to launch out on a scheme of mechanisation. In the building industry there has been a significant increase in activity both in the private and the public sector.

Although no statistics are available of actual consumption of timber in all timber using industries, it would be reasonable to assume an overall 10% increase in the annual demand for timber. With a progressive reduction in the imports of timber such as Burma Teak and Pine Boards and the promotion of an export trade for luxury Ceylon timbers such as Satin and Ebony about a million cubic feet of timber will have to be exploited in excess of the present production. Hence by 1970 the target of production should be about 12 million cubic feet as against the present 6 million (approximately).

7. Five Year Programme

(a) ROAD PROJECTS

The target for the 5 year period is to construct 60 miles of road. Hitherto these programmes have been in charge of Forest Officers and this limits the type of work which can be done, as they are not competent to build complex engineering structures. If the roads programme is to succeed at the rate envisaged, it is essential that a qualified engineer be in charge of the project particularly as mechanised methods will have to be used to execute the programme.

A rough estimate of the amount of timber which will be made available by a road building programme is 50,000 to 100,000 cubic feet per mile of new road built. Thus the 5 year programme will make available 3 to 6 million cubic feet of timber.

(b) REFORESTATION PROJECTS

(i) Annual Planting Programme

	Acres
Teak	8,000 (Co-op. planting &c. with Food Crops)
Eucalyptus and Pine	1,000
Enrichment planting	3,025
Miscellaneous	1,000
Total	13,025

Annual Recurrent Expenditure

Expenditure annually for planting and maintenance	Rs. 2·3 million
Foreign exchange	Rs. 25,000 approximately

Capital Expenditure (over Five Year Period)	*Rs. c.*
(1) Buildings—Quarters for Plantation and Nursery staff	150,000 00
(2) Vehicles—Jeep with trailer	14,000 00
Foreign exchange	14,000 00
Additional staff required	One driver

Benefits of the Project

Timber—At maturity, timber to the value of over Rs. 215 million could be extracted annually.

Food crops to the value of over Rs. 1 million annually.

(ii) Eucalyptus Planting Project for Newsprint Mill

	Acres
Total extent to be planted	15,000
Extent to be planted during 5 year period	7,500
Annual planting target	1,500
Species	Eucalyptus
Site	Ambawela, Pattipola area in Nuwara Eliya District

	Rs. c.
1. *Annual Recurrent Expenditure*	
Surveying—construction of access roads: clearing and burning, planting, maintenance and nurseries	525,100 00
Foreign exchange	Nil
2. *Capital Expenditure*	
To be incurred during the 1st, 3rd or 4th years.	
(1) Buildings—Staff quarters, &c.	228,500 00
(2) Motor vehicles—Jeeps, tractors and trailers	87,000 00
Total capital expenditure	315,000 00
Foreign exchange	87,000 00

Benefits

This project when complete would produce over 3 million cubic feet of greenwood annually that could be converted into pulp.

Additional staff required

(i) One Junior Assistant Conservator of Forests
(ii) One Forest Ranger
(iii) Seven Plantation Overseers
(iv) Five Forest Watchers
(v) Two Jeep Drivers
(vi) Two tractor drivers
(vii) One Clerk cum storekeeper

(iii) Matchwood Planting Project

	Acres
Total extent to be planted	6,000
Extent to be planted in 5 year period	1,500
Annual planting target	300
Species	Telkekuna
Site	Mitirigala in Colombo District

	Rs. c.
1. *Annual Recurrent Expenditure*	
Clearing and burning—fencing, planting, maintenance and nursery work	101,000 00
Foreign exchange	Nil
2. *Capital Expenditure*	
Buildings—Overseers and Watchers quarters	30,000 00

3. *Benefits*

This project would on completion yield about 600,000 cubic feet of matchwood worth about Rs. 1·5 million annually.

4. *Additional staff*

(1) Two Plantation Overseers
(2) Two Forest Watchers

The tentative break up by districts and areas is as follows :

I. Teak

Division	*District*	*Areas*
Nothern	Jaffna	Killinochchi Iranamadu
Vavuniya	Vavuniya	Terravil Naganchoial Vannivilankulam Puvarasankulam

Division	*District*	*Areas*
North Central	Trincomalee	Kantalai Reserve
	Polonnaruwa	Gal Oya P. R.
		Hurulu Reserve
	Anuradhapura	Kahalla Reserve
		Nuwaragama
		Mihintale Reserve
		Padaviya P. R.
North Western	Kurunegala	Inamaluwa Reserve
		Pallekelle Reserve
Up-Country	Badulla	Bintenne
	Moneragala	Siyambalanduwa
		Wellawaya
Eastern	Batticaloa	Koralai Reserve
		Nuwaragala Reserve
		Omunugala Reserve
Southern	Hambantota	Tanamalwila
Western	Ratnapura	Rathkarawa
		Walawe Area
II. Eucalyptus		
Up-Country	Nuwara Eliya	Pattipola
		Ambawela
		Mahakudugalla
	Badulla	Ohiya
		Madulsima
		Erebedde
	Matale	Knuckles area
III. Matchwood		
Western	Colombo	Mitirigala Reserve
	Kalutara	Gallehetiyawa
		Yagirala
IV. Bamboo		
Eastern	Batticaloa	Koralai Reserve
		Panichenkerni
V. Mahogany		
Southern	Galle	Beraliya
		Kottawa
	Matara	Dediyagala
		Masmulla
		Kirindamahayaya
Western	Ratnapura	Delwella
		Morapitiya
		Bambarabotuwa
		Gilimale
	Colombo	Indikada
	Kalutara	Gallehetiyawa
		Yagirala
North Western	Kegalle	Kelani Valley P. R.

(c) TIMBER PRESERVATION

Timber for constructional work has traditionally been restricted to the handful of very hard species which are sufficiently durable in their natural state to resist the agencies of destruction—fungi and insects. This continued intensive demand for a limited number of species has resulted in these timbers being in short supply. There is, however, a wide range of medium hard timbers which have sufficient strength for constructional use, but these are, unfortunately, susceptible to attack by fungi and insects. These species could be made immune to such destruction by treatment with a preservative. A pressure plant for this purpose was installed in 1954, and used chiefly for the treatment of medium hard timbers in order to make them acceptable for use as railway sleepers and telegraph and transmission poles. Two more pressure plants are to be installed in the course of the year for the treatment of railway sleepers, telegraph and transmission poles, and building timbers. The development programme also provides for the installation of non-pressure plants for the treatment of these species which are less resistant to the penetration of preservatives. The effect of this programme will be to bring into the market a considerable volume of timber of species which have so far been used only on a limited scale or not at all.

Seasoning

Seasoning results in a higher recovery of utilizable sawn timber, and a better quality product with an increased useful life. Two kilns for seasoning timber rapidly were installed in 1958, and with the installation of more kilns this year the capacity will be increased by tenfold. The development programme provides for an increase of 150% over the total that will be available at the end of the year. The volume of seasoned timber that will be available is to be even further increased by air seasoning in sheds, a process which takes more time but has the advantage that the capital expenditure required is only a fraction of that needed for the kilns.

(d) UTILIZATION RESEARCH

The increased and more efficient utilization of timber can only be achieved by a greater and more accurate knowledge of the properties of the various timber species. The development programme provides for staff and equipment for intensified research into the basic physical properties of timber and utilization techniques, and training of personnel who will be conducting utilization operations in the field.

(e) U. N. SPECIAL FUND PROJECT

A new United Nations Special Fund project has been mooted to demonstrate the commercial feasibility of mechanising logging and extraction operations. If approved by the Cabinet and U. N. Special Fund, it is hoped to commence operations in 1967. The project is expected to operate for a period of three years and supply about 1 million cubic feet per year to the Forest Department. The Special Fund will supply expert assistance and equipment while the Ceylon

Government will provide the other personnel and undertake the maintenance and repair of the machinery provided. The contrubution of the Special Fund will be approximately US $ 764,000, while the total Government counterpart contribution will be about US $ 550,000. This will be a self-financing project since the timber will be supplied to the Forest Department and will be paid for by the latter Department at rates which are normally paid to contractors. If the expected quantity of timber were in fact supplied by contractors, the Forest Department will pay out as much as 2½ million rupees annually to the contractors. Thus Government stands to gain substantially if this project is approved.

8. Organizational Set Up

STAFF

The work of the Forest Department has greatly increased in the last decade. For instance, the total extent planted in 1955 was 1,682 acres while in 1964 it was about 10,000 acres. Expansion has also taken place in many other fields but the provision for staff has remained more or less static. This has created difficult problems. Thus, while replanting has been greatly accelerated, the maintenance of plantations has not kept pace and this meant that the full potentialities of a site are not exploited. Further, much experimental work is necessary before embarking on new programmes of work such as matchwood planting, bamboo planting and so on. The question of forming a Timber Corporation has been discussed and a Memorandum on this subject will contain staffing proposals, but for the purpose of the present plan and also taking into account the fact that no significant staff changes have taken place in this Department the following additional staff is proposed :—

1	Deputy Conservator of Forests
5	Junior Assistant Conservators of Forests
5	Foresters
25	Forest Rangers
125	Forest Guards

These are in addition to the special staff required who are listed under each project.

9. Timber Corporation

The formation of a Timber Corporation to handle the Commercial Activity of the Department has been proposed by the Planning Committee on Industry. A separate memorandum has been drawn up in this connection. As this is only a proposal which has not yet been accepted by Government it has been excluded from the 5-Year Plan.

QUANTITY OF TIMBER SUPPLIED

Year	Logs Cubic Feet		Sawn Timber Cu. ft.	Sleepers B. G.	Firewood Cu. Yds.	Outside Slabs Nos.	Poles Nos.	Ceylon Teak Logs Cu. ft.
	Plywood	Other than Plywood						
1955	278,986·9	436,773·4	421,221·0	51,517	140,867·6	135,829	367,551	—
1956	269,110·4	558,264·4	459,960·9	115,027	168,354·4	127,527	415,652	—
1957	221,483·1	647,027·6	391,014·1	132,749	198,933·4	57,291	395,594	—
1958	191,537·8	547,792·4	425,075·9	187,619 13,820(N.G.)	201,717·2	67,847	421,964	15,902·8
1959	208,014·8	643,837·7	494,288·9	228,044 14,948(N.G.)	229,501·0	15,357	316,707	10,961·7
1960	372,697·7	696,710·5	345,853·8	130,761	203,336·5	44,307	208,017	3,210·2
1961	488,533·6	706,528·6	346,262·9	135,889	177,879·9	23,509	205,615	4,936·1
1962	461,263·3	875,803·1	398,314·6	182,409	176,307·0	18,113	269,972	9,676·9
1963	531,753·2	1,904,610·8	539,355·0	148,279 54(N.G.)	170,668·0	—	321,756	—
1964	514,267·6	1,775,447·4	545,739·4	132,163	180,198·4	—	402,867	—

SCHEDULE

Project 1—Proposed Road Programme

The mounting demand for timber for an increasing variety of uses can be met by—

(a) Extracting more timber from the forests; and

(b) Utilizing more closely the timber so made available.

In order to achieve the former, extraction operations will have to be extended into areas which are now either inaccessible or not economically accessible because of the lack of proper roads. The construction of roads into well stocked areas is a prime requisite. It is proposed to construct roads in the following areas :—

1. Kanneliya-Dediyagala group of forests
2. Sinharaja group of forests
3. Morapitiya-Ruhunukande group of forests
4. Bambarabotuwa-Gilimale-Eratne group of forests
5. Conical Hill-Ohiya-Pattipola group of plantations.

The annual targets will be 5, 10, 15, 15 and 15 miles at costs of Rs. 100,000 ; Rs. 200,000 ; Rs. 300,000; for the next 3 years thus making a total local cost of Rs. 1,200,000 over the five years. The foreign costs will be Rs. 400,000 for tractors and air compressors—this will be incurred in equal amounts in the first two years.

It is essential that this Department have a road construction unit to execute this work. The staff proposals are as follows :—

One Roads Engineer Two Roads Inspectors	These posts must be filled by officers seconded from the P. W. D. It will not be practicable for this Department to recruit suitably qualified persons as the limited scope for Engineers in the Department, will act as an obstacle.

Ten Forest Overseers; Three Tractor Drivers; Six Compressor Operators; Sixty Labourers.

The staff should be recruited in the first year. The volume of timber made available through these roads will be from 50,000 to 100,000 cubic feet per mile.

Project 2—Proposals for Logging and Extraction

The output of timber from the forests of Ceylon cannot be appreciably increased unless extraction operations are mechanised. At the present time the U. N. Special Fund Project on Forest Industries Development is making studies on the type of equipment and working methods best suited to conditions in this country. This project ends in 1967 and in the normal course, assuming that the trials reveal that certain types of equipment would be suitable, provision would have to be made in 1967/68 for purchase of machinery.

However, another U. N. Special Fund Project has now been mooted to carry the present investigations a stage further. The new project envisages the setting up of about four complete logging and extraction units capable of handling about one million cubic feet of timber per year. If this project is approved, it can continue after the end of the present project without a break. Since all the equipment will be supplied by the U. N. Special Fund, no provision by the Forest Department will be necessary during the 5 year plan period for the purchase of equipment.

Provision will, however, have to be made for counterpart funds from 1967 onwards (i.e. in the Financial Year 1966/67). The amounts will be known only after the project is worked out in detail.

Project 3—Proposed Programme for better utilization of timber

The closer utilization of timber will require more modern sawing facilities. The Department does not intend to expand its activities in this field. It would be preferable to have this service performed by contractors who should be encouraged to invest in modern sawing machinery.

SUB-PROJECT (I)

More timber seasoning facilities in order to obtain higher recovery of utilizable sawn timber, and a better quality product with an increased useful life. The investment in timber seasoning sheds is to be Rs. 75,000 a year for 5 years—a total of Rs. 375,000 local costs.

SUB-PROJECT (II)

The Department expects to instal, in the course of the financial year, 5 Seasoning Kilns with a capacity of 2,000 cubic feet. It is proposed to increase seasoning capacity by installing 5 kilns of 800 cubic feet capacity each during the period of the plan at the following rate : one in the 2nd, 3rd and 4th years and 2 in the 5th year. Each Kiln will cost —

	Rs.
Local	110,000
Foreign	70,000

On the basis of a kiln run of 3 weeks each kiln will have an annual seasoning capacity of about 13,000 cubic feet and thus during the plan period an annual capacity of 65,000 cubic feet will be installed.

The additional staff required will be —

4 Seasoning Officers
12 Depot Overseers
12 Kiln Operators
30 Labourers

The staff should be provided over the first two years.

SUB-PROJECT (III)

Increased facilities for treating timber with preservatives in order to extend the utilizable range of non durable species and the life of moderately durable ones. Two pressure impregnation plants are to be installed in the course of the financial year. Provision may be made for :

2nd Year : 12 'Perfusion' plants for treating poles, piles and fence posts. The annual capacity of each plant would be 1,500 poles and 2,000 fence posts if worked full time. These plants are of a very simple kind which can be constructed locally from imported parts and hence the cost/benefit ratio is extremely low:

	Rs.
Local cost	9,000
Foreign cost	15,000

3rd Year : 4 'Diffusion' plants for treating building and furniture timber. Each plant will have a capacity of 500 cubic feet per day or 135,000 cubic feet per year. On the assumption that preservative treatment adds about Rs. 3 per cubic foot to the value of timber the annual increase in value (benefit) would be about Rs. 400,000. Again, this gives an extremely low figure for cost/benefit ratio:

	Rs.
Local cost	15,000
Foreign cost	50,000

4th Year : 4 'Diffusion' plants for treating building and furniture timber :

	Rs.
Local cost	15,000
Foreign cost	50,000

One mobile pressure plant for treatment of building timber. The capacity of this plant will be 200 cubic feet per day or 54,000 cubic feet per year. On the basis of a value addition of Rs. 3 per cubic foot the annual benefit is Rs. 162,000

	Rs.
Local cost	50,000
Foreign cost	150,000

Cost benefit ratio = 1·2

5th Year : 4 'Diffusion' plants for treating building and furniture timbers :

	Rs.
Local cost	15,000
Foreign cost	50,000

1 Plant for vapour drying and preservation of sleepers and poles. This plant does away with the necessity to season sleepers and poles before impregnation and thus degrade consequent on prolonged air seasoning is avoided. Also there is no time lag between conversion and preservative treatment and this provides flexibility in that output can be increased at short notice. The capacity of the plant is 3–400 cubic feet per day or 80–100,000 cubic feet per year.

The annual benefit is thus between Rs. 250,000 and Rs. 300,000 :

Local cost	150,000
Foreign cost	400,000

Cost benefit ratio between 1·8 and 2·2

The staff required will be —

3 Foremen
30 Depot Overseers
30 Plant Operators
90 Labourers

Wood preservatives (recurrent) Rs. 10,000 for 2nd year, Rs. 30,000 for 3rd year and Rs. 50,000 annually thereafter—foreign costs.

The staff should be provided over the 2nd, 3rd and 4th years.

The additional accessory equipment for preservation and seasoning will be :—

2 Straddle Carriers—
Rs. 175,000 (Foreign costs) over the 3rd and 4th years ;
4 Fork Lift trucks—
Rs. 300,000 (Foreign costs) over the 3rd and 4th years ;
24 Portable Chain saws—
Rs. 48,000 (Foreign costs) over the 2nd and 3rd years ;
2 Cranes—
Rs. 200,000 (Foreign costs) over the 2nd and 3rd years ;
12 Winches—
Rs. 50,000 (Foreign costs) over the 2nd and 3rd years ;
Lorries and Jeeps—
Rs. 60,000 (Foreign costs) over the first three years.

The staff required will be—

6 Truck Operators
1 Lorry Driver
3 Jeep Drivers
2 Crane Operators

The staff should be provided over the 2nd, 3rd and 4th years. A Mechanical Engineering unit will be required to service the equipment to be obtained (as well as the equipment already in the Department) and attend to repairs expeditiously and economically.

The staff proposals are as follows :—

1 Mechanical Engineer (to be seconded from the Government Factory for the same reasons given for the Roads Engineer)
2 Mechanical Foremen
10 Mechanics
1 Storekeeper
10 Labourers.

The staff should be provided in the 1st year.

The cost of establishing this Unit will be—

Rs. 30,000 for buildings (local costs) first year,
Rs. 30,000 for equipment (foreign costs) first year.

Project 4—Research

Intensified research into the basic physical properties of timbers and utilization techniques, and training of personnel.

The following staff will be required in the first year :—

4 Timber Development Officers
8 Technical Assistants.

These officers will also direct and supervise field operations.

Other costs : Rs. 100,000 for buildings (local costs) 1st year
Rs. 100,000 for equipment (foreign costs) 1st year
Rs. 120,000 for further equipment (foreign costs) over the next 4 years.

Project 5—Reforestation

Sub project (i) Existing Reforestation Programme to be continued during Five Year Plan

Annual Planting Programme :

Teak	8,000 acres (Co-operative planting, &c., with food crops)
Eucalyptus and Pine ..	1,000 acres
Enrichment planting ..	3,025 acres
Miscellaneous ..	1,000 acres

Anual Recurrent Expenditure :

Expenditure annually for planting and maintenance	Rs. 2·3 million
Foreign exchange	Rs. 25,000 approximately

Capital Expenditure (over Five Year period) :

(1) Buildings—Quarters of Plantation and Nursery staff	Rs. 150,000
(2) Vehicles—Jeep with trailer	Rs. 14,000
Foreign exchange	Rs. 14,000

Additional staff required :

1 Driver

Benefits of Project :

(1) Timber—At maturity timber to the value of over Rs. 215 million could be extracted annually.

(2) Food crops—Annual value of food crops over Rs. 1·2 million

Sub-project (ii) Eucalyptus Planting Project for Newsprint Mill

This is a planting programme specifically to supply raw material to the proposed newsprint mill. Finality has not yet been reached regarding the establishment of this mill and thus this planting programme will be required only if it is decided to establish the mill :

Total extent to be planted	15,000 acres
Extent to be planted during 5 year period	7,500 acres
Annual planting target	1,500 acres
Species	Eucalyptus
Site	Ambawela-Pattipola area

1. *Annual Recurrent expenditure :*

Surveying—construction of access roads ; clearing and burning, planting, maintenance and nurseries	Rs. 525,100
Foreign exchange	Nil

2. *Capital Expenditure :*

To be incurred during the 1st, 3rd or 4th years.

(1) Buildings—Staff quarters, &c.	Rs. 228,500
(2) Motor vehicles—Jeeps, tractors and trailers	Rs. 87,000
Total capital expenditure	Rs. 315,000
Foreign exchange	Rs. 87,000

Benefits :

This project when complete would produce over 3 million cubic feet of greenwood annually that could be converted into pulp.

Additional staff required :

(i) 1 Junior Assistant Conservator of Forests
(ii) 5 Forest Rangers.
(iii) 14 Plantation Overseers
(iv) 5 Forest Watchers
(v) 2 Jeep Drivers
(vi) 2 Tractor Drivers
(vii) 1 Clerk cum Storekeeper

Sub-project (iii) Matchwood Planting Project

Total extent to be planted	6,000 acres
Extent to be planted in 5 year period	1,500 acres
Annual planting target	300 acres
Species	Telkeluna
Site	Mitirigala

1. *Annual Recurrent Expenditure*

Clearing and burning—fencing, planting, maintenance and nursery work Rs. 101,000

Foreign exchange Nil

2. *Capital Expenditure :*

Buildings—Overseers and Watchers quarters Rs. 30,000

3. *Benefits :*

This project would on completion yield about 600,000 cubic feet of matchwood, worth about Rs. 1·5 million annually.

4. *Additional staff :*

(1) Two Plantation Overseers

(2) Two Forest Watchers

Project 6—Survey of Minor Forest Produce

Staff required

1 Junior Assistant Conservator of Forests.

SUMMARY OF ADDITIONAL STAFF REQUIRED

1 Deputy Conservator of Forests
7 Junior Assistant Conservators of Forests
1 Engineer (Roads)
1 Engineer (Mechanical)
4 Timber Development Officers
2 Roads Inspectors
8 Technical Assistents
5 Foresters
30 Forest Rangers
125 Forest Guards
16 Plantation Overseers
42 Depot Overseers
4 Seasoning Officers
30 Plant Operators
12 Kiln Operators
10 Mechanics
2 Clerk/Storekeepers
7 Forest Watchers
6 Truck Operators
2 Tractor Drivers
1 Lorry Driver
6 Jeep Drivers
2 Crane Operators

Labourers required have not been mentioned.

SUMMARY OF EXPENDITURE

	1st Year		2nd Year		3rd Year		4th Year		5th Year	
	Local	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*	*Local*	*Foreign*
Project 1—Roads	100,000	200,000	200,000	200,000	300,000	—	300,000	—	300,000	—
Project 3 :										
Sub-project (i) Seasoning sheds ..	75,000	—	75,000	—	75,000	—	75,000	—	75,000	—
(ii) Seasoning kilns ..	—	—	110,000	70,000	110,000	70,000	110,000	70,000	220,000	140,000
(iii) Timber preservation ..	—	—	9,000	15,000	15,000	50,000	15,000	50,000	15,000	50,000
	—	—	—	—	—	—	50,000	150,000	150,000	400,000
Accessory equipment (Straddle Carriers) ..	—	—	—	—	—	75,000	—	100,000	—	—
Fork Lift Trucks	—	—	—	—	—	150,000	—	150,000	—	—
Chain saws	—	—	—	24,000	—	24,000	—	—	—	—
Cranes	—	—	—	100,000	—	100,000	—	—	—	—
Winches	—	—	—	25,000	—	25,000	—	—	—	—
Lorries and Jeeps	—	20,000	—	20,000	—	20,000	—	—	—	—
Project 4—Research	100,000	100,000	—	30,000	—	30,000	—	30,000	—	30,000
Project 5—Reforestation :										
Sub-project (i) Continuation ..	2,300,000	25,000	2,300,000	25,000	2,300,000	25,000	2,300,000	25,000	2,300,000	25,000
	30,000	14,000	30,000	—	30,000	—	30,000	—	30,000	—
(ii) Newsprint	582,800	17,400	582,800	17,400	582,800	17,400	582,800	17,400	582,800	17,400
(iii) Matchwood	107,000	—	107,000	—	107,000	—	107,000	—	107,000	—
Total ..	3,294,800	376,400	3,413,800	526,400	3,319,800	586,400	3,569,800	592,400	3,779,800	662,400

Total Local cost	17,578,000
Total Foreign cost ..	2,744,000
Grand Total	20,322,000

SECTION III

Boards and Corporations

CHAPTER I

RIVER VALLEYS DEVELOPMENT BOARD

Gal Oya Valley

Review of Development

Up to the establishment of the Gal Oya Development Board in 1949, development of water resources was only for either irrigation or hydro power. Isolated schemes were taken up without planning for the development of the water resources of a river basin together. The Gal Oya Development scheme was the first attempt at planned development of a river valley from a multi-purpose point of view. The scheme was designed as an irrigation, flood control as well as hydro-power development scheme. The Gal Oya Development Board Act was based on the Tenessee Valley Authority of America and the Damodar Valley Act of India. It set up an autonomous body for the complete and co-ordinated development of the region from all aspects inclusive of irrigation, water supply, drainage, power generation and supply, flood control, soil erosion control and reafforestation and general agricultural and industrial development as well as economic and cultural progress of the area of authority.

2. The assets created by the Board from the grant received from Government, Foreign Aid and work done by other Departments as well as the Board's own revenue to end of 1962–63 are as follows :—

	Rs.	c.
1. Colonization and Land Development, at cost	94,618,355	01
2. Irrigation facilities, at cost	209,799,902	24
3. Island-wide Power Link up at cost	10,217,233	45
4. Roads and Communications, at cost	42,841,317	31
5. Agriculture and Animal Husbandry, at cost	4,769,752	24
6. Meteorological Station, at cost	25,970	81
7. Buildings, at cost	64,937,501	31
8. Plant, Machinery & Tools after deducting aggregated depreciations	23,616,402	73
9. Motor Vehicles and Launches after depreciation	3,126,134	86
10. Equipment, furniture & fittings after depreciation	2,039,984	33
11. Investment of Security Deposits	22,362	90
12. Loans to Co-op. Societies	1,142,068	25
13. Investments and Loans, i.e. for Sugar Industry	38,316,209	17
14. Expenditure on Uda Walawe	1,049,068	39
15. Stock and Stores	20,271,016	83
16. Debtors	10,044,943	29
17. Cash in hand and at Banks	35,171,608	72
18. Excess of expenditure over revenue for administration, maintenance and depreciation	81,838,878	02
19. Services to G.A., Amparai	716,498	82
Total	644,565,208	70
Less items 13, 15 & 17	94,000,000	00
	550,500,000	00

Irrigation

3. The Board besides constructing the main Senanayake Samudra with a capacity of 770,000 acre feet has also constructed five major subsidiary reservoirs as well as several small reservoirs and village tanks. The total storage capacity of all the reservoirs constructed by the Board is 988,033 acre feet. Irrigation facilities provided by the Board includes 83.8 miles of main channels, 190 miles of distributory channels, 846 miles of field channels and 5,200 irrigation structures. When the full development on the Right Bank for both paddy and sugar is completed the Board will have constructed 376 miles of main and distributary channels as well as 1,194 miles of field channels and 6,132 irrigation structures. The Board has, to date, provided irrigation facilities to 53,552 acres of new land and improved irrigation facilities to 34,511 acres of existing paddy land. Irrigation facilities have also been provided for about 7,000 acres of sugar cane and 1,300 acres of tobacco fields in addition. Damage by floods which was an annual feature before the building of the main and subsidiary reservoirs has now been reduced to negligible proportions in the Valley.

Land Development

4. Nearly 9,000 families have been settled in the Gal Oya Valley inclusive of village expansion areas. The population of the Valley which was 20,000 approximately at the time the Board was set up has now increased to 115,000. Besides the 96,374 acres of new and existing lands provided with irrigation facilities, 22,000 acres of highland have also been developed. About 400 acres which was run as a coconut plantation by the Board has now been given out among allottees. About 240 acres have been developed under citrus.

Agricultural Production

5. When the scheme was inaugurated the production of paddy in the Valley was 1,631,600 bushels valued at Rs. 11,421,200. Annual paddy production has now risen to over 4,500,000 bushels valued at Rs. 32 million showing an increase of about Rs. 20 million which is an annual saving in foreign exchange. Highland crops as well as animal husbandry bring in a revenue to the settlers of Rs. 1,200,000. Egg production in the valley at present is about 600,000 per year.

Communications

6. The Board has constructed 122.5 miles of tarred roads, 296 miles of gravel roads and 250 miles of agricultural roads, 24 bridges, 698 culverts and 12 causeways have also been constructed. The Air Strip at Amparai was also constructed by the Gal Oya Board. Telecommunication services in the Valley have been developed by the construction of three auto exchanges, two manual exchanges, 427 miles of telephone lines and 307 telephones.

Power Generation and Supply

7. The Power House at Inginiyagala has four turbines of 10,000 kilowatts capacity. The Board has constructed 227 miles of transmission lines and 44 miles of distribution lines. The Board has also installed 87 sub-stations and besides supplying its own requirements for industrial as well as other needs also supplies all local bodies in the area, Batticaloa Urban Council, Kattankudi, Kalmunai, Eravur and Sammanturai Town Councils, some Village Committees as well as the Valachchenai Paper Factory.

Social Services

8. The Board has constructed 45 schools, 3 hospitals, and one dispensary within its area of authority. Seven Police Stations have also been established. Pipe-borne water service has been provided in Amparai town, Inginiyagala and the sugar area. The total length of pipe lines laid is 66 miles and sewerage pipes laid are 37 miles. 34 Village halls, 47 Co-operative Stores and 488 communal wells have also been provided. 51 villages and many townships have been established. 7,700 colonist cottages and 3,500 staff quarters have also been provided.

Industries

9. The Board has established several industries.

(*a*) Tile Factory with an annual output of over 1,600,000 tiles has been established. The factory though at commencement was running at a loss is running at a profit from 1958/59.

(*b*) Rice Mill at Chavalakadai which was established with machinery available in Ceylon with the Department of Marketing has shown steady improvement and is now running at a profit and mills annually over 6 lakhs of bushels of paddy.

(*c*) Carpentry Workshop and Saw Mill which was running at a loss for several years has now been established on a sound footing and shows profit. It supplies furniture to the University of Ceylon and the Department of Education as well as a limited quantity to the private market.

The income of the Board from industrial development in 1964 was as follows :—

	Rs.
Sugar	3,300,000
Distillery	8,600,000
Rice Mill	700,000
Carpentry Workshop and Saw Mill	1,750,000
Brick and Tile works	550,000
Power Generation	2,500,000

The increase in paddy production has added to the national wealth about Rs. 20,000,000 annually so that the total addition to the national wealth as a result of the activities of the Board is about Rs. 37,450,000.

Programme of Development

The development of lands directly irrigated under the Senanayake Samudra and subsidiary reservoirs is nearly complete. Other development works like roads, communications, land development, etc. have also been almost completed. The development of the left bank was completed sometime back and the area has partly been handed over to the normal administrative agencies of Government. Similar action in respect of the whole area of authority under the Gal Oya reservoir is being taken to hand back to normal agencies of Government. Construction and maintenance of roads and buildings, the operation and maintenance of the power plant and installation, medical services, etc., are in the process of being handed over to the normal Departments of Government. It is expected that this process will be completed in the course of 1966 and 1967.

Irrigation

About 2,280 acres remain to be provided with irrigation facilities on the right bank of the Senanayake Samudra and 1,380 acres under Namal Oya. Irrigation facilities have also to be provided for 4,000 acres of sugar cane. These items will be completed in the first two years of the plan period.

Drainage

As a result of the development of about 100,000 acres of paddy land under the reservoir and the resultant drainage water flowing to the coastal area, about 6,000 acres of paddy land in and around Periya Kalapu have become water logged. The programme of development provides for the drainage of this area by pumping and construction of groins, if necessary, to reclaim 6,000 acres of paddy land at an estimated cost of Rs. 3,000,000.

The Development of highland and other crops

The programme also provides for the development of about 19,000 acres under economic crops with the provision of lift irrigation where possible. This includes the extent provided for youth settlements.

New reservoirs

The programme provides for the restoration of the Panalgama and Pannal Oya tanks. The Panalgama tank can irrigate 4,000 acres. The cost of the headworks and the channel system is about Rs. 7 million and the cost of land development is Rs. 4 million. The construction of the Pannal Oya headworks and the channel system is estimated at Rs. 8,550,000 and will benefit 4,500 acres. The cost of land development is Rs. 4,500,000. The acreage under these tanks will be mainly used for the settlement of the excess labour of the River Valleys Development Board in the Gal Oya Valley.

Annexure 'A' gives a schedule of the proposed expenditure. Annexure 'B' gives the programme of irrigation facilities and land development.

APPENDIX 'A'

GAL OYA VALLEY—EXPENDITURE PHASING

	1966	1967	1968	1969	1970	*Total*
Irrigation : Gal Oya R.B; Namal Oya; Sugar Cane	1,500,000	1,500,000	—	—	—	3,000,000
Land Reclamation—5,000 acres	250,000	250,000	500,000	—	—	1,000,000
Highland Development	200,000	200,000	400,000	400,000	400,000	1,600,000
Drainage	—	300,000	300,000	1,500,000	900,000	3,000,000
Total	1,950,000	2,250,000	1,200,000	1,900,000	1,300,000	8,600,000
PANALGAMA TANK						
Investigation & designs	200,000	150,000	100,000	50,000	50,000	550,000
Headworks	—	750,000	2,000,000	1,250,000	—	4,000,000
Channel system	—	250,000	1,500,000	1,250,000	—	3,000,000
Land Development	500,000	1,000,000	1,000,000	1,000,000	500,000	4,000,000
Total	700,000	2,150,000	4,600,000	3,550,000	550,000	11,550,000
PANNAL OYA						
Designs	50,000	50,000	100,000	150,000	150,000	500,000*
Headworks	—	—	—	1,000,000	2,000,000	3,000,000*
Channel system	—	—	50,000	150,000	2,000,000	2,200,000*
Land Development	—	—	—	500,000	1,000,000	1,500,000*
Total	50,000	50,000	150,000	1,800,000	5,150,000	7,200,000*
Total for Gal Oya Valley	2,700,000	4,450,000	5,950,000	7,250,000	7,000,000	27,350,000

* Carried over beyond plan period.

APPENDIX 'B'

LAND DEVELOPMENT PROGRAMME—GAL OYA VALLEY

Scheme	*1966*	*1967*	*1968*	*1969*	*1970*
Gal Oya—Paddy	2,280	—	—	—	—
Namal Oya—Paddy	1,380	—	—	—	—
Gal Oya—sugar cane	2,000	2,000	—	—	—
Highlands—Gal Oya	—	2,000	2,000	4,000	4,000
—Panalgama	—	500	1,000	1,000	1,000
—Pannal Oya	—	—	—	500	1,000
Total acrage	5,660	4,500	3,000	5,500	6,000

CHAPTER II

RIVER VALLEYS DEVELOPMENT BOARD

Uda Walawe Multi-Purpose Reservoir Project

Description of Project and overall Plan of Development

1. The Walawe basin covers an area of 965 sq. miles extending from the central hill massif of the Island to the south-eastern coast in the Ambalantota-Hambantota area. The rainfall figures in this area vary from an average over 100 inches for the northern section to 40 inches near the Hambantota coast. Belihuloya, Belioya, Mau-Ara, Thimbolketiya Ganga and several other small streams fall into the Walawe Ganga and the annual average discharge of the river is 1,100,000 acre feet of water. The existing irrigable area is 20,000 acres of which 15,000 acres are irrigated by the Liyanagahatota Anicut and the channel from it to lands lying in the Hambantota District. The rest of the area specially the area on the left bank of Walawe Ganga is very poorly developed. The long-term proposals for the development of the Walawe Ganga basin include reservoirs at Samanalawewa, Uda Walawe, Weli Oya, Mau-Ara and Chandrikawewa. Chandrikawewa which is formed by a dam constructed across the Hulanda Oya irrigates 5,000 acres and the headworks have been completed. The irrigation facilities will be completed before the end of the current financial year. A contract for the detail of designs and specifications for a multi-purpose reservoir at Samanalawewa has been entrusted to an American firm of Engineering Consultants.

2. The Cabinet by its decision in May 1963 approved an estimate of Rs. 135 million for the construction of the Uda Walawe Reservoir and canal system. This estimate included provision for an earth dam, concrete structures including spill and sluices for the closure of the river, hydro-power station of 5,000 K.W. Capacity, and the necessary high-tension transmission lines to connect up with the Island grid, and the access road to the reservoir sites.

3. Tenders were called for the construction of the concrete spillway, sluices and the power plant. The condition of the tender also provided for submission of alternate designs. These alternate designs provide for the closure of the river by an earth dam, for the siting of the spill on the left bank and for the power plants with a total capacity of 5,400 K.W. in the right and left bank irrigation sluices. A central sluice is provided for emptying the reservoir in case of necessity and for emergency releases to the area irrigated under Liyanagahatota Anicut. The alternative design provides for an increase of 24,000 acres feet in the storage capacity of the reservoir. This increase coupled with the diversification of agricultural crops increases the irrigation potential of the reservoir by 10,000 acres. Those alternative proposals were accepted by the Ministry Tender Board and the contract was awarded to Technoexport of Praha, Chechoslovakia.

4. The Uda Walawe Reservoir Project approved by the Tender Board will provide for a 2½ miles long earth dam across the Walawe Ganga at a location about 3 miles north-east of Thimbolketiya. The maximum height of the dam will be 130 feet and it will carry a 24 feet roadway on the crest. The spillway will be located on the left bank end of the dam with provision for five radial gates. An emergency natural rock spill is also provided. The power plants one on the right bank of 1,800 K.W. capacity and one on the left bank of 3,000 K.W. capacity are incorporated in the irrigation sluices. A 26 miles long channel will take off from the right bank sluice of the reservoir and continue south-eastwards up to Embilipitiya and then in a westward direction to Manamperigama. This canal and its distributory system will irrigate 23,500 acres for the cultivation of paddy and a small block of sugar cane. It will also supply the additional water required for Yala cultivation under Chandrikawewa. The left bank main channel will take off in a south-easterly direction and will continue for a distance of 40 miles to end up-stream of Bodagiriya Tank on the Malala Oya. This channel and its distributory system will irrigate 23,500 acres for the cultivation of paddy, sugar cane, citrus and cotton. It will also supplement the irrigation requirements of lands under Liyanagahatota Anicut—Ridiyagama Tank Irrigation System.

5. The irrigation water discharged through the two canal sluices will be used for the production of hydro power. The installed capacity of the power plants as already stated will be 5,400 K.W. and the annual generation of power will be 21 million K.W.H. The hydro power developed will be fed into the main Island grid. For this purpose and for the distribution of power in the south-eastern area of the Island, the high-tension line from Balangoda will be extended southwards to Ambalantota and from thence to Hambantota and Tissamaharama. Spur lines will take off from the main grid to feed existing and proposed industries in the area as well as villages and townships which will develop.

6. The area to be irrigated as already described will be 60,000 acres. The associated development of highland will be about 30,000 acres. The distribution of new irrigable land under the project will be as follows :

	Acres
Paddy	36,500
Sugar Cane	6,200
Citrus	2,000
Cotton	15,300

7. It is proposed to phase the development over a period of nine years from 1963/64 to 1971/72. The headworks of the reservoir and the power plants will be completed within a period of three years. The provision of irrigation facilities and land development within these three years will be for about 7,500 acres and will be stepped up to 10,000 acres per year from the fourth year onwards.

8. The unit of alienation of land for paddy cultivation will generally be 2 acres paddy and 1 acre highland. It is proposed to alienate the land to landless peasants, surplus employees of the Land Development and other Government Departments, encroachers who are in occupation of Crown Land especially in the right bank area, and people who are in occupation of highlands, under L. D. O. permits in the project area. The pattern of development proposed for areas set apart for sugar cane, citrus and cotton has not been decided as yet.

9. For the commencement, industrial development in the areas will be confined to those industries which are ancillary to the land development and colonisation work of the area. One of the major requirements for development work will be the brick and tile factory for the building projects. The National Small Industries Corporation proposes to establish a tile factory capable of producing 2½ million to 3 million tiles per year. Preliminary investigations have revealed the existence of suitable clay deposits about 5 miles south of Embilipitiya. Detailed investigations are now in hand by the Geological Survey Department.

10. Another requirement for building construction work will be large quantities of timber. Timber is also required for telegraph posts and electric transmission lines. A saw mill already exists at Timbolketiya run by the Forest Department. This, however, is not sufficient to meet the needs of the project. It is, therefore, proposed to enlarge this sawmill and to instal a timber impregnation plant for the treatment of soft wood. The estimated cost of these proposals is Rs. 1,200,000.

11. It will also be necessary to establish a Base Workshop for the repair of heavy machinery in the Uda Walawe area. The transfer of the tyre re-building plant from Amparai to Uda Walawe and also the giant stone crusher or installation of other crushing equipment in the Uda Walawe Project Area are also necessary. The estimated cost of these is Rs. 3 million.

12. The provision of a sugar factory, ginning, spinning and weaving mill and other industries will also be necessary towards the latter part of the development programme. These proposals have not been investigated and finalised. Provision has not been included for them. Provision in a sum of Rs. 1,200,000 will, however be necessary for the cultivation of 500 acres of sugar cane and the manufacture of sugar by the Khandsari process. This will also serve as an experimental station for the Island in sugar. An application has been made under the C. Plan for the services of an expert to advise on the setting up and running of a sugar experimental station.

13. The area proposed to be developed is backward and the left bank of the scheme is almost completely undeveloped, and has no communication facilities at all. The development plan, therefore, provides for the construction of a system of main roads to a total length of 110 miles. The more important of

these roads is the Uda Walawe–Thanamalwila Road about 18 miles in length which will shorten the distance between these points by over 50 miles. Provision is included in a sum of Rs. 15,500,000 for the major roads, bridges and causeways. About 600 miles of agricultural and service roads estimated to cost Rs. 12 million will be required to serve the colonists who are being settled in the area. The P. W. D. roads in the area are narrow and unsuitable for heavy traffic. A sum of Rs. 15 million has been included for their improvement by the P. W. D. Postal and telecommunication services are also essential and are now non-existent in the area. Provision in a sum of Rs. 4 million for postal services and Rs. 5 million for tele-communication services have been included.

14. The number of colonists who will be settled in the paddy area alone is 18,250. The number of families to be settled will be considerably more when the sugar cane, citrus and cotton areas are also taken into consideration. Necessary amenities like townships, village centres, medical and sanitary services, education services as well as services by other departments like Police, Judiciary and Excise have also to be provided. The provision for these will be as follows :

(*a*)	Three Townships with provision for public offices, staff quarters, commercial centres internal roads, water supply and electricity	Rs. 25 million
(*b*)	For 80 village centres—one village centre for 300 colonists with provision for Co-operative stores, markets, quarters for Co-operative Inspectors and Agricultural Extension Officers, Paddy Stores, &c. at Rs. 200,000 per centre	Rs. 16 million
(*c*)	Medical services	Rs. 5 million
(*d*)	Education services	Rs. 15 million
(*e*)	Other miscellaneous services	Rs. 5 million

UDA WALAWE MULTI-PURPOSE RESERVOIR PROJECT PROPOSED CAPITAL EXPENDITURE

15. Part I.—Agricultural and Power Development

Item		*Rs.*
1.	Dam and Headworks, including hydrel power and transmission lines linked to all Inland grid	65,355,000
2.	Rural electrification	11,000,000
3.	Irrigation facilities for 60,000 acres	66,645,000
4.	Land Development including subsidies	52,000,000
5.	Agricultural and Service roads—approximately 600 miles	12,000,000
6.	Major roads, bridges and causeways	15,500,000
7.	Agricultural Extension Services	3,000,000
8.	Forestry	1,256,000
		226,756,000

Part II.—Public Amenities and Social Services

Item	*Rs.*
9. Establishment of Postal Services	4,000,000
10. Establishment of Telecommunication Services	5,000,000
11. Improvements to P.W.D. roads—approximately 90 miles	15,000,000
12. Provision of an Air Strip at Embilipitiya	1,500,000
13. Establishing townships at Timbolketiya, Suriyawewa and Chandrikawewa including utility services	25,000,000
14. Establishment of village centres 80 Nos.	16,000,000
15. Medical and Sanitary Services (Buildings and Equipment)	5,000,000
16. Education Services (Buildings and Equipment)	15,000,000
17. Police, Judicial and Excise Services and Survey Dept. Buildings.	5,000,000
	91,500,000

Part III.—Industrial Development

18. Saw Mill & Timber Impregnation Plant	1,200,000
19. Establishing Base workshop, and installing Tyre Rebuilding Plant and Crusher Plants	3,000,000
20. Sugar Cane Nursery and Khandsary Plant	1,200,000
	5,400,000

Part IV.—Administration and General Charges

21. Land Acquisition	1,000,000
22. Administration by the Board	38,000,000
23. Contingencies	11,000,000
	50,000,000

SUMMARY

I—Agricultural and Power Development	226,756,000
II—Public Amenities and Social Services	91,500,000
III—Industrial Development	5,400,000
IV—Administration and General Charges	50,000,000
Total	373,656,000

Detailed make up of the various items are given in Appendix 'A'

16. The annual increase in production and addition to the national income as a result of undertaking this scheme will be as follows :—

	Rs.
(*a*) Paddy 3,100,000 bushels	21,700,000
(*b*) Sugar cane 120,000 tons @ 20 tons per acre at Rs. 40 per ton	4,800,000
(*c*) Citrus production at Rs. 600 per acre	1,200,000
(*d*) Cotton 120,000 cwts. at 8 cwts. per acre at Rs. 50 per cwt.	6,000,000
(*e*) Hydrel Power production 21 million K.W.H. at 6 cts. per unit	1,260,000
(*f*) Highland crops	1,000,000
Total	35,960,000

17. The activities of the former Gal Oya Development Board has been expanded by an Amendment Act of Parliament named "River Valleys Development Board (Amendment) Act" No. 6 of 1965, with the object of absorbing development activities in other River Basins. This newly constituted Body has been placed in charge of the development work of Uda Walawe Basin.

Progress of Construction

18. Construction work on the main dam commenced in 1964. The right bank section of the dam as well as the main and subsidiary channels are being done directly by the River Valleys Development Board. A contract has been entered into for the construction of the left bank of the dam, river closure, as well as the irrigation sluices on the left and right banks and the power house, with Messrs Techno Export, Czechoslovakia, in the latter half of 1964. About 4,000 feet of the dam from the right bank has been completed by the River Valleys Development Board. The contractors have commenced work on the clearing of the dam base and the construction of the core trench and grouting of same. The first three miles of the left bank channel have been completed and the 4th and 5th miles are under construction. The first 6 miles of the right bank channel also have been completed and work has commenced from the 7th to the 9th mile. Progress has also been made in the construction of the necessary access roads. About 600 excess labourers of the Land Development Department have been settled at Suriyawewa where a township is being built.

Development Programme

19. The construction of the reservoir and power house will be completed by end of 1967.

The development programme provides for the irrigation of 34,000 acres under paddy and 30,000 acres of highland development as well as development of the part of the sugar, cotton and citrus areas. The necessary amenities like roads, townships, health services, educational facilities, telecommunications, police stations, etc. will also be undertaken. Annexure 'B' gives the programme of expenditure on these items. Annexure 'C' gives the programme of irrigation facilities and highland development.

APPENDIX 'A'

A DETAILED MAKE UP OF THE ITEMS

1. *Dam and Head Works including Hydrel Power.*

63,355,300 Part of detailed estimate for Rs. 135,000,000
2,000,000

Rs. 65,355,300

Say Rs. 65,355,000

2. *Rural Electrification.*

Rs. 11,000,000 Electrical Department Estimates.

3. *Irrigation facilities for 60,000 acres.*

L. B. Main Channel	25,794,700	Part of detailed estimates for Rs. 135,000,000
R. B. Main Channel	14,410,000	
L. B. Distributory System	14,690,000	
R. B. Distributory System	11,750,000	
Rs.	66,644,700	

Say Rs. 66,645,000

4. *Land Development including subsidies.*

	R. B.	*L. B.*	*Total*
Paddy	23,000	13,500	36,500
Sugar	500	5,700	6,200
Citrus	—	2,000	2,000
Cotton	—	15,300	15,300
Rs.	23,500	36,500	60,000

Paddy	36,500 acres at Rs. 1,000	36,500,000
Sugar	6,200 acres at Rs. 650	4,030,000
Citrus	2,000 acres at Rs. 650	1,300,000
Cotton	15,300 acres at Rs. 650	9,945,000
	Rs.	51,775,000

Say Rs. 52,000,000

5. *Agricultural and Service Roads (600 miles)*

600 miles at Rs. 20,000 — Rs. 12,000,000

6. *Major Roads, Bridges and Causeways*

Roads 110 miles	125,000- -Rs. 13,750,000 Say Rs. 14,000,000	
Moraketiya bridge	450,000 (detailed estimate)	
Submersible bridge	90,000 do.	
Liyanagahatota causeway	200,000 allowed sum	
Mau Ara bridge	760,000 allowed sum	
		1,500,000
	Total	15,500,000

7. *Agricultural Extension Services.*
Rs. 3,000,000 (Agricultural Department Estimates.)

8. *Forestry Development.*
Rs. 1,256,000 (Forest Department estimates.)

9. *Postal Services.*
Rs. 4,000,000 (Postal Department estimates.)

10. *Telecommunication Services.*
Rs. 5,000,000 (Telecommunication Department estimates.)

11. *Improvements to P. W. D. roads (90 miles approximately)*
Rs. 15,000,000 (P. W. D. estimates.)

12. *Air strip at Embilipitiya.*
Rs. 1,500,000

13. *Townships Rs. 25,000,000.*

Provide for public offices, staff quarters, commercial centres, parks and playgrounds with internal roads, water supply, drainage and electricity supply.

Timbolketiya	(approximate population 3,000)	Rs.	3,000,000
Chandrikawewa	(approximate population 10,000)		17,000,000
Suriyawewa	(approximate population 5,000)		5,000,000
			25,000,000

14. *Village centres.*

(1) Village Centre for 500 colonist cottages.

Dev. area allottees

L. B. Paddy	2,000 @ 3 ac.	..	Rs. 666	
	11,500 @ 2 ac.	..	5,750	
Sugar	5,700 @ 4 ac.	..	1,425	
Citrus	2,000 @ 4 ac.	..	500	
Cotton	15,300 @ 4 ac.	..	3,825	
				12,166
R. B. Paddy	23,000 @ 2 ac.	..		11,500
R. B. Sugar				75
Say 80 Village centres		..	Rs.	23,741

Allow for Co-op. Stores, Manager's quarters, Market and cemetery in every village, Co-op. Inspector's quarters and Agricultural Extension Officers' quarters at one in 3 villages, go-downs at 1 in 10 villages and roadways within the village centres with water supply, &c. Rs. 200,000 per village. 80 villages—Rs. 16,000,000.

15. *Medical and Sanitary Services.*
Rs. 5,000,000

Medical Department estimates for buildings	..	3,500,000
Allow for equipment	..	1,500,000
	Rs.	5,000,000

16. *Education Services.*

Rs. 37,000,000

Village Schools	6,000,000 (Education Dept. Estimate)
Furniture and equipment	2,000,000 (allowed sum)
Central School	2,000,000
Additional Schools due to changes in units of alienation	5,000,000
Rs.	15,000,000

17. *Police Services.*
Rs. 3,800,000 Estimates Dept. reduced.
Judicial Services.
Magistrate's Rural Courts Rs. 500,000 (allow sum) and quarters
Excise Services.
Offices and quarters Rs. 200,000 (allow sum)
Survey Department buildings
Offices and quarters Rs. 500,000 (allow sum)
Say Rs. 5,000,000

18. *Saw Mill and Timber Impregnation Plant.*

Rs. 1,200,000

19. *Establishing Base Workshop, Tyre-Rebuilding Plant and Crusher Plant*

Allow sum Rs. 3,000,000

20. *Sugar Cane Nursery and Khandsary Plant*

Say Rs. 1,200,000

21. *Land Acquisitions.*

	Rs.
Thanketiya 12,500 acres at Rs. 50	625,000
Other acquisitions for construction work L. B. area—700 acres at Rs. 500	350,000
Timbolketiya and Reservoir—67 acres at Rs. 50 ..	3,350
Hinguru Ara—200 acres at Rs. 1,000	200,000
	1,178,350

Say Rs. 1,600,000

22. *Administration by Board.*

Rs. 3,000,000 (Provided in Rs. 135,000,000 estimates)
Rs. 35,000,000 (approx.) 10 per cent. of target estimates)

Rs. 38,000,000

23. *Contingencies.*

Say Rs. 11,000,000

APPENDIX 'B'

RIVER VALLEYS DEVELOPMENT BOARD—DEVELOPMENT PROGRAMME FOR UDA WALAWE VALLEY—1966-70

	1966	*1967*	*1968*	*1969*	*1970*	*Total*
Dam, Headworks and Hydrel Power	11,823,000	26,947,000	15,000,000	6,230,000	—	60,000,000
Rural Electrification	1,200,000	1,100,000	1,500,000	2,100,000	1,500,000	7,400,000
Right Bank, Main Left Bank, Main	6,500,000	6,500,000	8,500,000	6,300,000	5,000,000	32,800,000
Branch channel system including distributaries	3,000,000	4,500,000	4,500,000	4,500,000	4,000,000	20,500,000
Roads system, main	1,500,000	2,000,000	3,500,000	3,500,000	3,500,000	14,000,000
Roads, minor	500,000	500,000	1,200,000	2,000,000	2,000,000	6,200,000
LAND DEVELOPMENT						
Paddy ; Highland, Citrus, Cotton, Sugar	60,000	4,100,000	6,600,000	6,700,000	9,400,000	26,860,000
Airstrip	—	—	—	1,500,000	—	1,500,000
Postal services	500,000	1,000,000	1,000,000	1,000,000	—	3,500,000
Telecommunications	500,000	2,000,000	2,000,000	500,000	—	5,000,000
Townships	2,360,000	2,500,000	5,000,000	5,000,000	5,000,000	19,860,000
Village centres	—	400,000	400,000	1,900,000	1,900,000	4,600,000
Forestry	—	100,000	256,000	250,000	250,000	856,000
Agricultural Extension	—	260,000	440,000	500,000	500,000	1,700,000
Inland Fisheries	—	—	—	100,000	—	100,000
Tourism	100,000	150,000	100,000	—	50,000	400,000
Health Services	1,200,000	1,200,000	500,000	310,000	400,000	3,610,000
Education	3,000,000	3,000,000	4,500,000	9,000,000	9,000,000	28,500,000
Police	500,000	1,000,000	1,000,000	1,000,000	1,000,000	4,500,000
Excise	—	—	—	200,000	—	200,000
Magistrate's Court	—	130,000	130,000	120,000	120,000	500,000
Sugar Factory	—	—	—	—	15,000,000	15,000,000
Land Acquisition	32,000	627,000	100,000	100,000	—	859,000
Agricultural Research	100,000	150,000	500,000	200,000	50,000	1,000,000
Management & Administration	3,419,000	5,000,000	5,000,000	5,000,000	5,000,000	23,419,000
	36,294,000	63,164,000	61,726,000	58,010,000	63,670,000	282,864,000

APPENDIX 'C'

THE PROGRAMME OF IRRIGATION FACILITIES AND HIGHLAND DEVELOPMENT

	1965/66	*1966/67*	*1967/68*	*1968/69*	*1969/70*
Paddy land	—	3,500	10,000	10,000	5,000
Highland	—	1,600	5,000	5,000	400
Other Crops	200	9,000	1,500	2,900	500

CHAPTER III

SAMANALAWEWA RESERVOIR AND POWER PROJECT

Reference has been made earlier to the preparation of final plans, specifications, estimates, etc. for the construction of the Samanalawewa reservoir and power project. If this scheme is approved by Government work on the project can commence in 1967. A tentative phasing of the expenditure and development of the land under this reservoir is given below :—

SAMANALAWEWA

	1967	*1968*	*1969*	*1970*	*Total*
Samanalawewa Head Works & Power	4,500,000	37,000,000	52,000,000	50,000,000	143,500,000
Channel system. Mau Aru reservoir and land development	500,000	8,000,000	8,000,000	8,000,000	24,500,000*
Total	5,000,000	45,000,000	60,000,000	58,000,000	168,000,000*
Paddy land acres	—	2,000	2,000	5,000	9,000*
Highland acres	—	1,000	1,000	2,500	4,500*

* Balance to be continued after 1970

CHAPTER IV

SUGAR INDUSTRIES

Sugar Projects in Ceylon

1. *Introduction.*—Sugar is one of the industries given priority for development in all under-developed countries. It is mainly an agriculture based industry and the raw material can be produced easily in under-developed countries. The process of manufacture of sugar also gives rise to a large number of by-products which in turn generate several subsidiary industries. In fact in certain South American countries, sugar factories have been set up mainly for their by-products and the manufacture of sugar itself is considered as a by-product in the production of raw material for other industries. Considering the per-acre return of sugar, it is a better foreign exchange saving crop than paddy. Even on a low average yield of about 20 tons per acre and 10 percent recovery, the foreign exchange saving per acre of sugar cane is about Rs. 1,200 as against Rs. 600 from paddy.

2. *Kantalai Sugar Project.*—The Kantalai sugar plantation was commenced in 1957 by the Department of Agriculture. The project as originally planned provided for the cultivation of a plantation of 8,000 acres. After leaving for channels, roadways, reservations, etc. the nett acreage under sugar cane was planned at 6,400 acres in four equal blocks of 1,600 acres of which three blocks were to be under plant cane, first ratoon and second ratoon at any one time and the fourth block was left to be fallow. The yield was estimated to commence at 30 tons per acre and to increase after 3 or 4 years of operation to 40 tons per acre. This yield was based on research plot yields in Polonnaruwa. The original plan provided for the harvesting of 50,000 tons of sugar cane in 1959 from 1,600 acres of plantation and to produce 5,600 tons of sugar with 10 percent recovery. The factory was to reach full production in 1961 with 192,000 tons of sugar cane from 4,800 acres producing 19,200 tons of sugar.

3. *Kantalai Sugar Factory.*—The factory was designed for an output of 20,000 tons of sugar per year. The factory has a crushing capacity of 1,200 tons of cane per day to start with, with provision for installing additional crushers to the capacity of 1,700 tons per day at a later stage if necessary. The factory is designed to work 160 days per year crushing 1,200 tons per day or 192,000 tons per season and produce 19,200 tons of sugar.

4. *Capital Expenditure at Kantalai.*—The original plan provided for the capital expenditure of Rs. 21,500,000 made up as follows :

	Rs.
(1) Site development and roads	410,000
(2) Building stores	3,770,000
(3) Water supply	450,000
(4) Lighting colony	300,000
(5) Plant machinery including freight, &c.	10,500,000
(6) Insurance, handling and erection	2,480,000
(7) Furniture office and factory	75,000
(8) Sundries, vehicles, oil tanks, &c.	400,000
(9) Contingencies	800,000
(10) Working capital for 6 months	815,000
(11) Customs duty on plant machinery, &c.	1,500,000
Total	21,500,000

Subsequently along with the annual budget estimates a sum of Rs. 6.6 million was provided as below,

	Rs.
Water supply (channel section)	1,400,000
Approach Road	500,000
Investigation on second Sugar Project	100,000
Water supply (Mahaweli Ganga Scheme)	1,600,000
Alcohol Project	3,000,000
	6,600,000

making a total of Rs. 28,100,000. Of this amount the Corporation was granted only Rs. 26,400,000. Subsequently the Kantalai Project had incurred Rs. 2,500,000 in 1961/62 for the cultivation of sugar cane with the take off from the Department of Agriculture of the sugar cane plantation by the Corporation. The allocation in 1962/63 was Rs. 3 million as capital expenditure and Rs. 6 million as loan for working expenses. The allocation given for capital expenditure in 1963/64 was Rs. 1,400,000 and for the current financial year 1965/66 is Rs. 1,400,000 bringing the total of grants given to the Corporation to Rs. 34.7 million and the loan for working expenses to Rs. 6 million.

The development and cultivation of the plantation to the end of September 1961 was done by the Department of Agriculture. The amount spent on the development of 1,750 acres by the Department of Agriculture is Rs. 16,850,000 and the amount given as working expenses for the cultivation of sugar cane was Rs. 2,500,000 annually for the financial years from 1957/58 to 1960/61. The total expenditure on the Kantalai Sugar Corporation so far is therefore as follows :—

	Rs.
Capital grants to the Corporation	36,600,000
Development of land by the Department of Agriculture ..	16,850,000
Cultivation expenses, Department of Agriculture ..	10,000,000
Total ..	63,450,000

5. *Progress of the Sugar Cane Plantation and Sugar Production at Kantalai.*—About 1,300 acres were planted in 1957/58 which was ready for harvesting in 1959, but this could not be harvested as the factory was not ready. The factory commenced production in 1960 and the statement below gives the progress made :

	1960	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*
Acreage available for harvesting ..	2,030	1,175	1,200	2,340	3,987	4,200	4,000
Acreage harvested ..	400	230	894	1,610	2,603		2,980
Duration of crushing season ..	57 days	25 days	69 days	71 days	92 days		133 days
Tons of cane crushed ..	6,076	3,537	14,995	25,608	29,984		53,115
Average daily crushing (tons) ..	120	140	215	361	326		487
Tons of sugar manufactured ..	266	390	1,090	1,467	1,974		3,273
Recovery rate (sugar as % of cane)	4.5%	8.6%	7.4%	6.6%	6.75%		6.22%
Molasses produced (tons) ..	319	155	860	1,613	2,100		2,950
	Rs.	*Rs.*					
Factory cost of production per ton	1,564	635					

Note : 1 Long Ton=1·016 Metric Tons

(*a*) *Cane Yields.*—Though the original plan provided for a yield of 40 tons per acre after about 3 years, the actual yield at Kantalai was 16.5 tons per acre in 1962, 19 tons in 1963 and about 20 tons per acre in 1964. The yield for 1965 is however, very poor and is about 17 tons per acre. The main reason for this is lack of irrigation due to drought conditions prevailing in the area.

(*b*) *Plantation.*—Though the plan provided for the cultivation of 4,800 acres to give the full requirements of the sugar cane of the factory, because of the low yields this was not possible. 4,000 acres have been brought under cultivation at Kantalai but with very poor yields the supply of cane has not been more than 1/6th the requirements of the factory.

(*c*) *Recovery Rate.*—The original plan provided for a recovery rate of sugar from sugar cane of 10 percent, but it will be seen from the statement above that this recovery rate has not been achieved.

(*d*) *Cost.*—The original plan provided for the delivery of harvested cane to the factory at an all inclusive price of Rs. 25 per ton of sugar cane. The harvesting cost alone using Pioneers was about Rs. 35 per ton of cane and using civilian labour about Rs. 18 per ton of cane. Transport to the factory is about Rs. 10 per ton of cane. The cultivation cost of a ton of cane has not been worked out at Kantalai, but is about Rs. 80 per ton of cane so that the cost of a ton of cane delivered at the factory works out at about Rs. 115. Because of the low production of sugar cane the factory overheads, depreciation, etc. are distributed over a smaller quantity and have sent the cost of factory production also to a high figure so that the cost of producing a pound of sugar comes to over Re. 1.00.

(*e*) The factory at full production was expected to produce 20,000 tons of sugar, but the production this year and last year was on the average about 2,000 tons of sugar per year or 10 percent of the factory capacity.

(*f*) *Alcohol Production.*—A distillery has been set up at Kantalai to make use of the by-products, molasses, at a cost of Rs. 3,000,000. The profits made on alcohol have reduced the losses incurred in the production of sugar.

(*g*) *Losses.*—The following are the losses by the Kantalai Sugar Corporation since commencement :—

	Rs.
1960–61	—
1961–62	1,668,895
1962–63	3,451,310
1963–64	(Rs. 306,833 provisional profit)

Gal Oya Sugar Project

6. The yield figures of 40 tons per acre in the Agriculture Department Research plots was also used for the planning of the Gal Oya Sugar Project. The plantation provides for the cultivation of 10,000 acres of which after allowing for roads, channels and reservations, the actual extent under cultivation will be about 8,000 acres cultivated in four blocks of 2,000 acres each. The factory was designed to crush 2,000 tons of cane per day and works for 160 days per year crushing 320,000 tons of sugar cane which at 10% recovery will produce 32,000 tons of sugar.

7. *Capital Expenditure at Gal Oya.* The total of loans granted for the development of the Gal Oya Sugar Project so far is Rs. 49,500,000 inclusive of the financial year, 1963/64. The loan granted for the current financial year 1965/66, Rs. 1,500,000, makes a total of Rs. 51,000,000. This amount was to meet the cost of the factory buildings, distillery and the quarters required for the factory staff, etc. The development of the land was undertaken from the main grants to the Gal Oya Development Board and the land was treated as leased to the Sugar Plantation at Rs. 40 per acre per annum. The expenditure

incurred in the development of land for the plantation and the provision of irrigation facilities up to end of the financial year 1963/64 was about Rs. 5·5 million.

8. *Progress of Sugar Cane Plantation and Sugar Production in Gal Oya.*

	1960	*1961*	*1962*	*1963*	*1964*	*1965*
Acreage available for harvesting	1,160	1,980	1,420	2,195	3,400	4,000
Acreage harvested	277	1,502	1,420	2,195	3,400	3,850
Duration of crushing season	31 days	107 days	113 days	100 days	144 days	115 days
Tons of cane crushed	7,200	42,241	41,418	46,770	68,373	—
Average of daily crushing (tons)	250	400	366·5	468	475	685·7
Tons of sugar manufactured	206	2,330	2,614	3,306	4,162	4,880
Recovery rate percent	4·91	5·51	6·31	7·06	6·08	6·17
Molasses produced (tons)	—	2,121	1,997	1,403	4,162	3,985
Cost per pound of sugar	—	1·39	1·70	1·23	1·23	—

Losses	*Rs.*
1959–60	3,011,381
1960–61	6,932,478
1961–62	11,018,312
1962–63	6,573,537
1963–64	2,156,171

The main causes in high cost of production and consequent losses are again due to low yields of cane and the poor progress made in the plantation so that the factory was kept working at about 12 percent capacity resulting in the distribution of overheads, depreciation, etc. over a small product. The distillery which was running at high profit from 1962/63 contributed to the reduction of losses for 1963/64 by a sum of Rs. 5,524,138.

9. *The Short-comings of the Sugar Projects.* The Government has appointed a Committee of Inquiry including two Experts from India in sugar cultivation and sugar manufacture to go into the working of the Sugar Projects and its report is awaited. Generally the low yields per acre and the poor recovery rate have contributed to a large extent towards the high cost of production. The plantation also has not expended to keep the factories in full production. The cost of cultivation has been much higher than originally anticipated.

10. *Plans.* Assuming that the yields will be about 25 tons per acre (this is about the world average inclusive of countries like Australia and America) both sugar plantations have to be expanded over the originally planned acreage for these plantations. Kantalai plantation has to be increased so that the extent under sugar cane is about 6,000 acres. To this must be added the

extent which has to be left fallow of 2,000 acres so that the total plantation will be 8,000 acres ; leaving aside for reservation, roads and channels the total extent of the Kantalai sugar plantation should be about 10,000 acres of which roughly 8,000 acres have been already developed. The amount required for developing this additional 2,000 acres is Rs. 4,000,000. The Kantalai Sugar Corporation does not have sufficient agricultural machinery at present and a sum of Rs. 3,000,000 is required for this. Very few quarters have been built both for the factory staff and the plantation staff and a sum of Rs. 3,000,000 more will be required for provision of these quarters so that the additional capital expenditure required over the next 4 years for the Kantalai Sugar Corporation is Rs. 10,000,000. In the case of Gal Oya the plantation has to be extended from the present 10,000 acres to 16,000 acres to give sufficient cane. This will involve a capital expenditure of Rs. 12,000,000 spread over the next 4 years.

CHAPTER V

STATE PLANTATIONS CORPORATION

Introduction

As a large extent of undeveloped Crown Land receiving the benefit of both monsoons was available in inaccessible areas, an adhoc Committee was appointed to investigate the possibility of Planting these Lands in the Islands traditional Commercial Crops. They considered that approximately 15,000 acres of land in Pelawatte-Hewessa area were suitable for planting in Tea. The first Plantation was to be, in extent, 1,000 acres and this was to be carved out of the 15,000 acres. The intention of Government has been to solve the twin evils of unemployment and landlessness. Tea is a crop which requires the largest amount of labour. A 1,000 acre Plantation of seedling Tea will alone give direct employment to approximately 1,500 persons or 750 families and if worked on the basis of V. P. Tea as is being done at present will provide direct employment to 2,000 persons or 1,000 families. These persons will consequently not only enjoy the benefits of a guaranteed minimum wage, but will also be housed in pleasant rural housing communities with modern facilities.

The most expeditious and suitable manner in which this land could be opened up was on lines similar to those adopted by private enterprise in the establishment of large scale Plantations in the Island. In this context, it was decided to establish a Government Sponsored Corporation for the purpose of not only opening up undeveloped Crown Land in commercial crops, but also to undertake the Management of planted land.

The Land Commissioner has, for sometime, been managing several Estates that had been acquired by Government. These Estates were run on lines similar to those managed by private Agency Houses. Experience has shown that managerial efficiency alone was insufficient and that it was difficult to run these properties within the frame work of the rules and regulations adopted by Government for the Management of its Departments, and in view of this the Estates previously Departmentally managed by Land Commissioner were handed over to the Corporation on 1.10.60.

Act No. 4 of 1958 provides for the establishment of the Ceylon State Plantations Corporation. The Members of the Corporation were appointed by the Hon. Minister of Lands and Land Development on the 1st of August 1958, and on this date, the Corporation was deemed to have been established.

The opening up of the 1,000 acre Plantation in Tea at Pelawatte off Migahatenne commenced in June 1959 and was completed in July, 1963. This was done two years ahead of schedule. The Factory is under construction and is expected to be completed this year. Out of the 1,000 acres 393½ acres were planted in V. P. and the balance in Seed. 881 acres have already come into bearing.

Work on the 3 new Plantations viz : Habarakada in Galle District, Samanalawatte in Ratnapura District and another in Nuwara Eliya were commenced in April 1963, February 1964 and April 1964 respectively. Planting operations are in progress. Each new plantation did not merely present the problem of opening up Jungle Land and Planting in Tea. It brought into the forefront the necessity of conditioning an untrained labour force in the work involved in opening up a Tea Plantation.

Programme

The Development Programme of the Ceylon State Plantations Corporation for the next five years consists of the raising of the following Plantations as per details in Schedule A :—

1. A Thousand Acre Project in Cashew in Kondachchi area in the Mannar District.

This has already been taken up, and during the current financial year, about 200 acres will be opened up at a cost of Rs. 150,000. It will be speeded up in the next two years and the area to be opened up will be 300 acres per year. In the fourth year (1968/69), 200 acres will be opened up to complete the 1,000 acre project. A statement showing the spacing of expenditure is given in Schedule B annexed.

This Plantation will begin to yield from about the 4th year of planting, but economic yields will come in about the 6th year. The average expected yield per acre is 350 lbs. Kernels, which would bring in a gross income of Rs. 700,000 per annum ; placing on an average wholesale price of Rs. 2 per pound of kernels.

An investment of Rs. 650,000 on this Project will begin to yield profits from about 1970, reaching a nett income of about Rs. 600,000 per annum from 1975 onwards.

This 1,000 acre Cashew Project will provide employment for an Executive and Subordinate employees like Conductors, Clerks and about 50 labourers. Seasonal employment will also be available for a large number of women and children, in the process of roasting the nuts, extracting the shell liquid and shelling the nuts to prepare them for the market.

It will also provide indirect employment due to transport and distribution of sales in the private sector.

2. It is also proposed to open up a Thousand Acre Plantation in Citrus provided the under ground source of water is found adequate, when the results of the experiments now carried out by the Israel Experts of the Department of Agriculture are available.

The Plantation will cost approximately Rs. 7,000,000 made up of as follows :

	Rs.
Establishment of a Sprinkler System of Irrigation at Rs. 3,500 per acre	3,500,000
Clearing and Planting at Rs. 1,200 per acre	1,200,000
Maintenance at Rs. 400 per acre for 3 years	1,200,000
Buildings and Vehicles	800,000
General Charges	300,000
Total	7,000,000

It is however considered desirable to restrict the activities of the Corporation to the opening up of only 50 acres in 1966–67 and watch the progress before venturing out on a very large scale.

The amount required for the first year is approximately Rs. 340,000 made up of as follows :

	Rs.
Establishment of a Sprinkler System of Irrigation at Rs. 3,500 per acre	175,000
Clearing and Planting at Rs. 1,200	60,000
Buildings and Vehicles	90,000
General Charges	15,000
Total	340,000

Schedule C gives the phasing of expenditure in the following years :—

In regard to the economic appraisal of this Project, it may be mentioned that from the fifth year onwards, the Citrus Plantation would come into bearing and the estimated annual income could be based at 200 oranges per tree at the rate of 170 trees per acre. At 10 cents per fruit, the gross income per acre will be approximately Rs. 3,400. Allowing about Rs. 600 for maintenance as well as for collection, there would be a nett income of Rs. 2,800 per acre per year on an investment of Rs. 7,000 per acre.

On completion of the Project and when the entire 1,000 acres come into bearing, the revenue that could be earned yearly will be in the neighbourhood of Rs. 2,500,000. This Project is calculated to reduce the cost of living especially of the middle class.

The employment opportunities provided by this Citrus Project are substantial. Apart from the Executives and the Subordinate Officers, there will be the need for about 200 labourers. The development of an area in Citrus will no doubt provide employment opportunities in the private sector for transport distribution, etc.

3. The Corporation has in hand the raising of three New Plantations in Tea apart from the 1,000 Acre Project at Pelawatte which has been completed.

Of these three New Plantations, two will be of 500 acres each and the third will cover an area of 1,000 acres. The estimated cost of a 1,000 acre Plantation in Tea is Rs. 11,000,000 while that of a 500 Acre Plantation is Rs. 6 Million. The phasing of expenditure in regard to these three New Plantations is given in Schedule D annexed. An economic appraisal in New Plantations in V. P. Tea has already been made in connection with the revision of the estimated cost of Pelawatte State Plantation. A V. P. Plantation comes into bearing in about four years. Assuming that the average yield per acre will be 2,000 pounds per year, the 2,000 acres involved in the opening of these three New Plantations will produce 4 Million pounds of Tea. All this, when valued at a conservative figure of Rs. 1.60 per pound, will bring in Rs. 6,400,000 in foreign exchange. This figure is exclusive of export duty, so that the gross foreign exchange earned will be in the neighbourhood of Rs. 7,400,000. Apart from the earning of this foreign exchange, the expansion of the Tea Industry will provide employment for four thousand labourers and 200 other grades of personnel. Judging from the economic development that has taken place in regard to the Pelawatte Project, these three New Plantations will also bring about a substantial economic progress in their vicinity.

On the assumption that all these proposals will be financed by the Government, the amounts required each year by the Ceylon State Plantations Corporation are given in Schedule A. Although it will take some time for these Plantations to come into bearing and bring the normal income, it will be possible for the Corporation to derive an income from the partial mature areas, but no account is taken of it in the schedules referred to.

In addition, this Corporation is engaged in the management of the following Estates and Factories previously managed by the Land Commissioner :—

1. Giragama/Yahalatenne-Dippitiya State Plantation
2. Higgoda/Knavesmire State Plantation
3. Yellangowry State Plantation
4. Yatawatta State Plantation
5. Eadella State Plantation
6. Nella Oolla State Plantation
7. Lachesis State Plantation
8. Mandaranuwara State Factory
9. Derangala State Factory
10. Delgoda State Factory

Most of the Estates handed over by the Land Commissioner were in a badly neglected condition and had to be partly or totally rehabilitated and the rehabilitation programme is almost complete except for Higgoda and Yatawatta.

In view of a recent directive given by the Hon. Minister, that uneconomic Estates be handed back to the Land Commissioner for Village Expansion, it is proposed to hand over Yellangowry, Yahalatenne/Dippitiya and Lachesis and the matter is under consideration.

SCHEDULE A

Project	*1965–66*	*1966–67*	*1967–68*	*1968–69*	*1969–70*	*Total*
1. 1,000 Acres Cashew in Kondachchi ..	150,000	137,720	127,400	97,280	53,600	566,000
2. 1,000 Acres Citrus ..	—	340,000	1,235,000	1,545,000	1,880,000	5,000,000
3. *Tea V. P.*						
(*a*) Habarakada 1,000 acres ..	1,535,212	4,053,730	1,933,875	1,161,025	769,645	9,453,487
(*b*) Samanalawatta 500 acres ..	1,378,580	1,249,480	2,588,000	136,140	—	5,352,200
(*c*) Nuwara Eliya 500 acres ..	1,073,500	1,423,250	1,090,250	2,173,000	128,325	5,888,325
Total ..	4,137,292	7,204,180	6,974,525	5,112,445	2,831,570	26,260,012

SCHEDULE B

CEYLON STATE PLANTATIONS CORPORATION DEVELOPMENT PROGRAMME—KONDACHCHI STATE PLANTATION 1,000 ACRES IN CASHEW—TOTAL COST Rs. 650,000

	Rs.
1st Year 1965–66 :	
200 Acres : Opening @ Rs. 352	70,400
Buildings	30,000
Carts and Vehicles	25,000
5 wells @ Rs. 4,000	20,000
Miscellaneous	4,600
	150,000
2nd Year 1966–67	
300 acres opening @ Rs. 352	105,600
200 acres Upkeep @ Rs. 33.60	6,720
5 wells @ Rs. 4,000	20,000
Miscellaneous	5,400
	137,720
3rd Year 1967–68	
300 acres opening @ Rs. 352	105,600
500 acres Upkeep @ Rs. 33.60	16,800
Miscellaneous	5,000
	127,400
4th Year 1968–69	
200 acres opening @ Rs. 352	70,400
800 acres upkeep @ Rs. 33.60	26,880
	97,280
5th Year 1969–70	
1,000 acres upkeep @ Rs. 33.60	33,600
5 wells @ Rs. 4,000	20,000
	53,600
6th Year 1970–71	
1,000 acres upkeep @ Rs. 33.60	33,600
7th Year 1971–72	
800 acres upkeep @ Rs. 33.60	26,880
8th Year 1972–73	
500 acres upkeep @ Rs. 33.60	16,800
9th Year 1973–74	
200 acres upkeep @ Rs. 33.60	6,720

SUMMARY

1st year 1965–66	150,000
2nd year 1966–67	137,720
3rd year 1967–68	127,400
4th year 1968–69	97,280
5th year 1969–70	53,600
6th year 1970–71	33,600
7th year 1971–72	26,880
8th year 1972–73	16,800
9th year 1973–74	6,720
Total	650,000

SCHEDULE C

PHASING OF EXPENDITURE

	Rs.
1966–67 :	
50 Acres Clearing and Planting @ Rs. 1,200	60,000
Establishment of a Sprinkler System of Irrigation @ Rs. 3,500 per acre	175,000
Buildings and Vehicles	90,000
General Charges	15,000
	340,000
1967–68 :	
200 Acres Clearing & Planting @ Rs. 1,200 per acre	240,000
50 Acres Upkeep @ Rs. 400 per acre	20,000
Buildings and Vehicles	200,000
Establishment of a Sprinkler System of Irrigation @ Rs. 3,500 per acre	700,000
General Charges	75,000
	1,235,000
1968–69 :	
250 Acres Clearing & Planting @ Rs. 1,200 per acre	300,000
250 Acres Upkeep @ Rs. 400 per acre	100,000
Establishment of a Sprinkler System of Irrigation @ Rs. 3,500 per acre	875,000
Buildings and Vehicles	200,000
General Charges	70,000
	1,545,000
1969–70 :	
300 Acres Clearing & Planting @ Rs. 1,200 per acre	360,000
500 Acres Upkeep @ Rs. 400 per acre	200,000
Establishment of a Sprinkler System of Irrigation @ Rs. 3,500 per acre	1,050,000
Buildings and Vehicles	200,000
General Charges	70,000
	1,880,000
1970–71 :	
200 Acres Clearing & Planting @ Rs. 1,200 per acre	240,000
750 Acres Upkeep @ Rs. 400 per acre	300,000
Establishment of a Sprinkler System of Irrigation @ Rs. 3,500 per acre	700,000
Buildings and Vehicles	110,000
General Charges	70,000
	1,420,000
1971–72 :	
750 Acres Upkeep @ Rs. 400	300,000
1972–73 :	
500 Acres Upkeep @ Rs. 400	200,000
1973–74 :	
200 Acres Upkeep @ Rs. 400	80,000

SUMMARY

	Rs.
1966–67	340,000
1967–68	1,235,000
1968–69	1,545,000
1969–70	1,880,000
1970–71	1,420,000
1971–72	300,000
1972–73	200,000
1973–74	80,000
	7,000,000

SCHEDULE D

HABARAKADA STATE PLANTATION 1,000 ACRES IN V. P. TEA— TOTAL COST Rs. 10,985,000

				Rs.
1st Year 1963–64 :				
104 acres—opening, clearing and planting	@ Rs.	2,000		208,000
3½ miles approach road	@ Rs.	10,000		35,000
Asst. Superintendent's Bungalow				60,000
Vehicles				30,000
General Charges on Estate				80,000
Head Office Charges				10,500
				423,500
2nd Year 1964–65 :				
150 acres—opening, clearing and planting	@ Rs.	2,000		300,000
104 acres—1st year upkeep	@ Rs.	720		74,880
150 acres—internal motorable roadways				30,000
30 twin cottages	@ Rs.	6,000		180,000
150 acres—water supply	@ Rs.	200		30,000
Lighting Plant for Office				11,500
Vehicles				71,000
Temporary buildings Rs. 20,000 ; maintaining approach road Rs. 2,625				22,625
General Charges Rs. 125,000 ; Head Office Charges Rs. 50,000				175,000
Contingencies				27,050
				922,055
3rd Year 1965–66 :				
175 acres—opening, clearing and planting	@ Rs.	2,000		350,000
150 acres— 1st year upkeep	@ Rs.	720		108,000
96½ acres—2nd year upkeep (reduced after re-survey)	@ Rs.	625		60,312
175 acres—internal roadways	@ Rs.	200		35,000
75 twin cottages	@ Rs.	6,000		450,000
175 acres—water supply	@ Rs.	200		35,000
Buildings : 2 Asst. Clerks Quarters			24,000	
Estate Office			25,000	
Head Clerks			25,000	
Co-op. Stores			12,000	
Manure Shed			8,800	
2 Lorry Drivers Quarters			13,800	
2 Supervisors Quarters			16,800	
Superintendent's Bungalow			100,000	
Office Equipment			16,500	
				241,900
Vehicles				30,000
General Charges			175,000	
Head Office Charges			50,000	
				225,000
				1,535,212

		Rs.	Rs.	Rs.
4th Year 1966–67 :				
225 acres—Opening, clearing and planting	@	2,000		450,000
175 acres—1st year upkeep	@	720		126,000
150 acres—2nd year upkeep	@	625		93,750
225 acres—internal motorable roads	@	200		45,000
225 acres—water supply	@	200		45,000
Buildings : 2 Conductors Quarters			60,000	
2 Asst. Clerks Quarters			30,000	
				90,000
Factory and Machinery				2,250,000
Tea Makers Quarters			25,000	
2 Asst. Tea Makers Quarters			30,000	
2 Engine Drivers Quarters			14,000	
				69,000
General Charges			275,000	
Head Office Charges			70,000	
				345,000
90 twin cottages	@	6,000		540,000
				4,053,750
5th Year 1967–68 :				
225 acres—Opening, clearing and planting	@	2,000		450,000
225 acres—1st year upkeep	@	720		162,000
175 acres—2nd year upkeep	@	625		109,375
225 acres—Internal motorable roadways	@	200		45,000
225 acres—Water supply	@	200		45,000
Buildings : 2 Schools			40,000	
4 Teachers Quarters			40,000	
1 Asst. Clerks Quarters			15,000	
Dispensary & Dispenser			17,500	
Junior S.D's Bungalow			60,000	
				172,500
90 Twin Cottages	@	6,000		540,000
Contingencies				50,000
General Charges Rs. 300,000 ; Head Office Charges Rs. 60,000				360,000
				1,933,875
6th Year 1968–69 :				
128½ acres—Opening, clearing and planting	@	2,000		257,000
225 acres—1st year upkeep	@	720		162,000
225 acres—2nd year upkeep	@	625		140,625
128½ acres—Motorable roadways	@	200		25,700
128½ acres—Water supply	@	200		25,700
Buildings : Midwife's Quarters			10,000	
Ward & equipment			20,000	
Communal facilities			20,000	
				50,000
Vehicles Rs. 50,000 ; equipment Rs. 50,000				100,000
Contingencies				50,000
General Charges Rs. 300,000 : Head Office Charges Rs. 50,000				350,000
				1,161,025

7th Year 1969-70 :

		Rs.
128½ acres—1st year upkeep	@ Rs. 720	92,520
225 acres—2nd year upkeep	@ Rs. 625	140,625
Machinery and Equipment		100,000
Sundry buildings		60,000
Furniture		50,000
Contingencies		50,000
General Charges Rs. 250,000 ; Head Office Charges Rs. 26,500		276,500
		769,645

8th Year 1970-71 :

128½ acres—2nd year upkeep	@ Rs. 625	80,312
General Charges Rs. 70,000 ; Head Office Charges Rs. 20,000		90,000
Contingencies		15,626
		185,938

SUMMARY

	Rs.
1st year— 1963-64	423,500
2nd year—1964-65	922,055
3rd Year—1965-66	1,535,212
4th Year—1966-67	4,053,750
5th Year—1967-68	1,933,875
6th Year—1968-69	1,161,025
7th Year—1969-70	769,645
8th Year—1970-71	185,938
Total	10,985,000

SCHEDULE E

SAMANALAWATTA STATE PLANTATION 500 ACRES IN V.P. TEA—TOTAL COST Rs. 6,000,000

				Rs.
1st Year 1964-65 :				
150 acres—Opening, clearing and planting	@	Rs. 2,000		300,000
150 acres—Internal motorable roads	@	200		30,000
2 Twin Cottages	@	6,000		12,000
150 acres—Water supply	@	200		30,000
Conductor's Bungalow				15,000
Vehicles —Lorry			25,000	
Jeep			26,000	
Bicycle			300	
				51,300
Temporary Buildings				6,000
Maintenance of approach road				3,500
General Charges Rs. 140,000 ; Head Office Charges Rs. 30,000				170,000
Contingencies				30,000
				647,800
2nd Year 1965-66 :				
200 acres—Opening, clearing and planting	@	Rs. 2,000		400,000
150 acres—1st year upkeep	@	720		108,000
200 acres—Internal motorable roads	@	200		40,000
200 acres—Water Supply	@	200		40,000
Superintendent's Bungalow			100,000	
Telephones			10,000	
Head Clerk's Bungalow			30,000	
Dispenser and Dispensary			17,600	
Office			20,000	
Store Keeper			6,910	
Midwife			6,340	
Assistant Clerk			11,000	
Rice Store			5,000	
Lorry Driver			6,910	
2 Supervisors Quarters			13,820	
Sundry Buildings			63,000	
				290,580
50 Twin Cottages	@	6,000		300,000
General Charges Rs. 160,000 ; Head Office Charges Rs. 40,000				200,000
				1,378,580
3rd Year 1966-67 :				
150 acres—Opening, clearing and planting	@	Rs. 2,000		300,000
200 acres—1st year upkeep	@	720		144,000
150 acres—2nd year upkeep	@	625		93,750
150 acres—Internal Motorable roadways	@	200		30,000

			Rs.
150 acres—Waterr supply	@Rs. 200		30,000
Buildings : Assistant Clerks' Quarters		11,000	
2 Supervisors Quarters		13,820	
Lorry Drivers Quarters		6,910	
1 School and 2 teachers Quarters		40,000	
S.D.'s Bungalow		60,000	
50 Twin Cottages	@Rs. 6,000	300,000	
			431,730
Vehicles			40,000
General Charges Rs. 150,000 ; Head Office Charges Rs.	30,000		180,000
			1,249,480

4th Year 1967-68 :

150 acres—1st year upkeep	@Rs. 720		108,000
200 acres—2nd year upkeep	@Rs. 625		125,000
Factory and Machinery			1,700,000
Tea Maker's Bungalow		30,000	
Assistant T.M.'s Bungalow		11,000	
2 Engine Drivers		14,000	
Loft Supervisor		7,000	
58 Twin Cottages	@Rs. 6,000	348;000	
			410,000
Contingencies			30,000
General Charges Rs. 170,000 ; Head Office Charges Rs.	45,000		215,000
			2,588,000

5th Year 1967-68 :

150 acres—2nd year upkeep	@Rs. 625	93,750
General Charges Rs. 35,000 ; Head Office Charges Rs.	7,390	42,390
		136,140

SUMMARY

1st year	1964-65	647,800
2nd year	1965-66	1,378,580
3rd year	1966-67	1,249,480
4th year	1967-68	2,588,000
5th year	1968-69	136,140
	Total	6,000,000

6

SCHEDULE F

NUWARA-ELIYA STATE PLANTATION 500 ACRES IN V.P. TEA
TOTAL COST Rs. 6,245,000

				Rs.
1st Year 1964-65 :				
50 acres—Opening, clearing and planting	@ *Rs.*	2,250		112,500
50 acres—Internal motorable roads	@ *Rs.*	200		10,000
5 twin cottages	@ *Rs.*	7,000		35,000
50 acres—water supply	@ *Rs.*	200		10,000
Vehicles—Lorry			30,000	
Tractor			15,000	
Jeep			26,000	
Bicycle			300	71,300
General Charges				95,000
Head Office Charges				10,875
Contingencies				12,000
				356,675
2nd Year 1965-66 :				
150 acres—Opening and planting	@ *Rs.*	2,250		337,500
50 acres—1st year upkeep	@ *Rs.*	720		36,000
150 acres—Internal motorable roadways	@ *Rs.*	200		30,000
150 acres—Water supply	@ *Rs.*	200		30,000
Buildings : Assistant Superintendent's Bungalow			60,000	
Conductors Bungalow			30,000	
2 Supervisors Quarters			16,000	
Rice Stores			5,000	
Drivers Quarters			7,500	
Lorry Garage			1,500	
Clerk's Bungalow			30,000	150,000
50 twin cottages	@ *Rs.*	7,000		350,000
General Charges Rs. 120,000 ; Head Office Charges Rs. 20,000				140,000
				1,073,500

3rd Year 1966–67 :

				Rs.
200 acres—Opening and planting	@	Rs. 2,250		450,000
150 acres—1st year upkeep	@	720		108,000
50 acres—2nd year upkeep	@	625		31,250
200 acres—motorable roads	@	200		40,000
200 acres—water supply	@	200		40,000
Buildings : 2 Supervisors Quarters			16,000	
Leaf Shed			3,000	
Tool Shed			5,000	
Assistant Clerks Quarters			15,000	
Maternity Ward and equipment			20,000	
Midwife's Quarters			10,000	
1 School and 2 Teachers Quarters			65,000	
Superintendent's Bungalow			100,000	
				234,000
50 twin cottages	@	Rs. 7,000		350,000
General Charges Rs. 140,000; Head Office Charges Rs. 30,000				170,000
				1,423,250

4th Year 1967–68 :

100 acres—Opening and planting	@	Rs. 2,250		225,000
200 acres—1st year upkeep	@	720		144,000
150 acres—2nd year upkeep	@	625		93,750
100 acres—motorable roadways	@	200		20,000
100 acres—water supply	@	200		20,000
55 twin cottages	@	7,000		385,000
Dispenser and Dispensary			17,500	
Estate Office			15,000	
				32,500
General Charges Rs. 140,000 ; Head Office Charges Rs. 30,000				170,000
				1,090,250

5th Year 1968–69 :

100 acres—1st year upkeep	@	Rs. 720		72,000
200 acres—2nd year upkeep	@	625		125,000
Factory and Machinery				1,700,000
Teamaker's Bungalow			30,000	
Assistant Tea Maker's Bungalow			15,000	
2 Engine Drivers Quarters			14,000	
Loft Supervisor			7,000	
				66,000
General Charges Rs. 160,000 ; Head Office Charges Rs. 50,000				210,000
				2,173,000

			Rs.
6th Year 1969–70 :			
100 acres—2nd year upkeep	@	625	62,500
General Charges Rs. 40,000 ; Head Office Charges Rs. 20,000			60,000
Contingencies			5,825
			128,325

SUMMARY

1st year	1964–65	356,675
2nd year	1965–66	1,073,500
3rd year	1966–67	1,423,250
4th year	1967–68	1,090,250
5th year	1968–69	2,173,000
6th year	1969–70	128,325
	Total	6,245,000

SECTION IV

Power

CHAPTER I

INTRODUCTION

1. The main natural sources of energy are (*a*) Solid, Liquid and Gaseous fuels, (*b*) Geothermal energy, (*c*) Nuclear energy, (*d*) Hydraulic energy, (*e*) Tidal energy, (*f*) Marine heat, (*g*) Wind and (*h*) Solar energy. Of these the most continuously exploited resources are Solid, Liquid and Gaseous fuels, hydraulic energy and more recently tidal and nuclear energy. The fossil fuels—coal, petroleum and natural gases are exploited intensively and at the present increasing rate of consumption in the world it will be completely depleted sooner or later. Tidal and Solar energy though inexhaustible are generally characterised by expensive construction costs to harness them and by limitation of availability. Hydro electric energy has to be developed at the most favourable river or lake sites, irrespective of the centre of the load demand. The energy generated will also depend on the seasonal and other changes in the river flow. Geothermal energy and Marine heat can, as far as is known at present, be developed only at a few places in the world. Similarly Tidal. Wind and Solar energy are subject to periodic variations which are often unpredictable.

2. Ceylon which has no natural source of energy, other than Hydro energy, will therefore, have to depend for the future on the Hydro potential available in the country. At the moment, however, the energy requirements of the country are met from—(*a*) Coal, (*b*) Kerosine Oil, (*c*) Diesel Oil, (*d*) Furnace Oil, (*e*) Manufactured Gas, (*f*) Electricity, (*g*) Motor Oil and (*h*) Firewood.

The quantity of fuels imported and their foreign exchange value during the year 1964 were as follows :—

	Gallons	*Rs.*
Kerosine Oil	37,228,000	20,152,000
Gas Oil	35,657,000	18,072,000
Diesel Oil	33,712,000	16,209,000
Furnace Oil	79,808,000	23,086,000

Practically all of the above imports were to meet household and industrial requirements which can be more economically and adequately met from electricity produced from Hydro sources, with a continuous saving in foreign exchange.

3. The Department's plans have, therefore, been worked out towards the achievement of the following results :—

(*a*) Replacement of the imported fuel by means of electricity provided from Hydro sources,

(*b*) Provisions of a plentiful supply of electricity for the Industrial development of the country, so that the productive efforts of mankind can be supplemented by the use of our natural resources.

Early History

4. The first public supply of electricity in Ceylon was inaugurated in Colombo in 1895. The project was in the hands of a private Company and the supply of electricity was principally for lighting purposes in dwellings. In the following year the Company operated an Electric Tramways system in Colombo. In 1902, however, a subsidiary Company called the Colombo Electric Tramways and Lighting Company took over both these functions and continued to operate till 1927 when the Government purchased the electricity supply system. Closely following the introduction of electricity into Colombo, Kandy was provided with a supply of electricity in 1901 by yet another private company called the Colombo Gas and Water Co., Ltd. The undertaking was purchased by the Kandy Municipality in 1922. In 1912 the Government inaugurated its first Scheme in Nuwara Eliya. With the transfer of Authority of the Kandy scheme to the Kandy Municipal Council and the Colombo scheme to the Department of Government Electrical Undertakings in 1927, all subsequent schemes were controlled by the Department or by the Local Authorities. In 1936 an Electricity Board was constituted. This somewhat autonomous body was given wide powers to administer the existing Department of Government Electrical Undertakings and to license and control other private electricity supply industries. The Board was only shortlived and was dissolved in 1937. Development activities till 1950 were stifled due to the depression in Nineteen Thirties and the Second World War, and thereafter due to the Rehabilitation programme of the manufacturing countries in the West. The real development of the electricity supply industry in Ceylon can, therefore, be considered as having commenced in the correct sense only in 1950.

5. The generating facilities so far provided by the Department of Government Electrical Undertakings consist of :—

(*a*) Hydro Power,

(*b*) Steam Driven alternator sets,

(*c*) Diesel Driven alternator sets.

Hydro Power Stations are situated at Laksapana, Norton Bridge and Inginiyagala.

The Laksapana power project was developed in stages viz :

STAGE I

On 30th October, 1950, Stage I of Ceylon's Aberdeen Laksapana Hydro Scheme was switched on harnessing Hydro Electric energy for the first time on a major scale in the service of our country. The total load on the Government's Electrical system was then about 15,000 kW., but within 4 years this load more than doubled itself. This Scheme cost approximately 60 million rupees and provided for 25,000 kW, of Hydro Electric Power at Laksapana Power Station, together with 66,000 volt transmission lines from Laksapana to Colombo, Laksapana to Norton Bridge and Laksapana to Peradeniya and a receiving station at Kolonnawa and primary substations at Norton Bridge, Avissawella, Padukka and Peradeniya. As in keeping with world trends there seemed to be no saturation point for the growth of demand for electric power, the Government was committed to embark on further power development schemes, basing its anticipations on a rate of development of about 15% per annum on a compound basis. Stages IIA and IIB of the H. E. S., then followed as a matter of course.

STAGE IIA

As it was clear that the country needed to obtain foreign loans for the purpose of these development projects, the Government entered into a loan agreement with the I. B. R. D. for 16½ million dollars to finance Stage IIA. This stage was inaugurated on 26th September, 1954 and completed in December, 1958. The work comprised a storage reservoir at Castlereagh on the Kehelgamu Oya and an extension to the Laksapana Power Station with an additional 25,000 kW., of power, a 132,000 volt Transmission line from Laksapana to Kolonnawa and the extension of the 66 kV transmission line from Kolonnawa to Bolawatte, Peradeniya to Kurunegala and Norton Bridge to Badulla ; primary substations at Nuwara Eliya, Badulla, Kurunegala and Bolawatte and 3 large substations in the Colombo area connected up with a 33,000 volt underground system. The total cost of these works including both foreign and domestic components amounted to Rs. 143,525,000. This included the cost of extending the 33,000 volt overhead network by about 200 miles and the construction of about 200 bulk supply substations for Industrial and Commercial consumers. By 1960 the demand on the electric network was about 50,000 kW of power and about 200 million kW hours of energy per annum. Electricity was thus brought to an area roughly about ⅓ of the Island.

STAGE IIB

Even before the completion of Stage IIA the enormous demand for electricity in the country required that further generation of power was urgently necessary. As the development of Hydro Power was found to require much time, it was decided to construct a steam power station at Grandpass to help tide over the situation and also to render firm the full exploitation of the water resources of the Kehelgamu Oya. When the Government plans for further development of this river matured, an additional loan from the I. B. R. D. amounting to 7·4 million dollars was obtained and work commenced on the stage known as Stage IIB 1st Thermal Set. The total cost including both foreign and domestic components was estimated to be Rs. 60,460,000 and provided for a 25,000 kW steam generating set at Grandpass, a 132 kV link from Grandpass to Kolonnawa Receiving Station, the construction of about 200 miles of 33,000 volt network and 200 bulk supply substations and the extension of the 11 kV system in Colombo town. The Steam Power Station at Grandpass, now known as Kelanitissa Power Station, was commissioned in September 1962 and has been filling a very essential need for conservation of water at the Castlereagh Reservoir, in addition to meeting the increase in system peak load over the

50,000 kW mark, which the combined Stages I and IIA of the Hydro Scheme were only able to produce. In the meantime, negotiations for the further Hydro Power development proceeded and a third loan from the I. B. R. D. was secured.

STAGE III (HYDRO SCHEME AND 2ND THERMAL SET.)

The third loan from the I. B. R. D. was for 15 million dollars which included also for a 2nd 25,000 kW steam generating set at Grandpass. The Hydro works comprised a 4 mile water tunnel from Castlereagh Reservoir to Norton Bridge, a 50,000 kW Hydro Power Station, Wimalasurendra Power Station at Norton Bridge, a 132 kV Transmission link from Norton Bridge to Laksapana to Galle *via* Balangoda and from Bolawatte to Puttalam, Primary substations at Galle, Balangoda and Puttalam, the uprating of Bolawatte substation from 66 kV to 132 kV and the attendant change over of voltage on the existing Kolonnawa to Bolawatte Transmission Line, 200 miles of 33 kV network, 300 bulk supply substations and a further extension to the 11 kV system in the Colombo area. The total cost of these works including the 2nd steam generating set at Kelanitissa Power Station in Grandpass and including both foreign and domestic components amounted to Rs. 154,700,000. The Castlereagh/ Norton Bridge Tunnel and the Wimalasurendra Power Station were commissioned in January 1965, the Second Steam Generating set at Kelanitissa Power Station in May 1964 and the Primary Grid Substation in the latter part of 1964.

The Inginiyagala Hydro Power Station constructed by the Gal Oya Development Board with Canadian aid uses the waters of the Senanayake Samudraya prior to it being discharged for irrigational purposes. It has a capacity of 11 MVA with an effective generating capability of 60 million units in an average year.

It is a low head station with four vertical type Francis turbines each developing 3,300 B. H. P. at a speed of 333·3 rpm under a head of 89 feet.

Each turbine is coupled on to an alternator 2,750 kVa each generating at 6·9 kV.

The Inginiyagala Power Station is linked on to our main grid at Badulla by means of a 132 kV tie line operating on 66 kV. This power station has fed into our system 40·8 million units during the year 1963/64.

Inginiyagala station will be taken over by the D. G. E. U. together with other electrical facilities of the Galoya Board, the finalisation of which has been held up due to procedial difficulties.

Steam Driven Alternator Sets

The Kelanitissa Power Station at Grandpass with a capacity of 50,000 kW was constructed under Stage IIB of the Hydro Scheme as stated earlier. The two boilers are oil fired and when at full capacity raises 250,000 lb. of steam at a pressure of 900 lb. sq. in. The steam driven turbines are coupled onto two alternators of 25 kilowatts each generating at 11,000 volts.

The Stanley Power Station which was a steam driven station with a capacity of 9 MW has now been shut down as it is uneconomical to run the same in view of the more efficient thermal plant now available at Grandpass.

Diesel Driven Alternator Sets

The Pettah Power Station sited at Gas Works Street, has a capacity of 18,000 kilowatts which consists of 3,000 kilowatts of team plant which are now rarely used and 15,000 kilowatts of diesel plant. These consists of six Mirlees engines of capacity 2 MW each and three General Motors of capacity 1 MW each. These plants are normally run to cater for the peak load and is reserved for use in case of an emergency.

The Chunnakam Power Station which was inaugurated in 1959 with four Mirlees diesel generators of 1 MW each supplies Jaffna town and the K. K. S. Cement Factory. It was recently augmented to a capacity of 8 MW with the installation of 2 Duetsz generating sets of 2 MW each.

There is a proposal to shift another three 2 MW sets from Pettah Power Station in order to increase the capacity of Chunnakam Power Station up to 14 MW to cater to the increasing load of K. K. S. Cement Factory.

6. The present maximum demand on the system is 87,000 kW and the consumption of energy is about 360 million kWH per annum. The Castlereagh Storage Reservoir 910 acres in area was impounded under Stage IIA in 1958 and contains about 1910 million cubic feet of water designed for a firm draw-off of 500 cusecs at 50 per cent. load factor or 1,000 cusecs at 25 per cent. The Main Tunnel is in fact designed for 1050 cusecs at full load at Wimalasurendra Power Station but the latter is intended for operation as a Peaking Station. Therefore, although there will be sufficient water during the rainy years (say 3 years out of 10) for full power generation of 50 MW at only a little below normal load factors at Wimalasurendra Power Station, the average energy is actually available at about 28 per cent. load factor. This amounts to a total of 385 million kWH average energy per annum from the existing plant at Laksapana and Wimalasurendra Power Stations. However, the firm energy is about 325 million kWH per annum and the firm power is 75 MW at 50 per cent. load factor. It may be mentioned that the same water is used for both power stations except that Laksapana may get a little more water due to the small catchment between Castlereagh and Norton. The head of water above Wimalasurendra Power Station is roughly half that above Laksapana. The first 25,000 kW thermal unit at Kelanitissa Power House was installed to render firm the full exploitation of the water resources of the Kehelgamu Oya. In effect this means that with the island's system Load Factor at 50 per cent the two existing Hydro Power Stations could have met a Maximum Demand of 75 MW without Thermal generation in the driest year, or a Maximum Demand of 100 MW by generating 113 million kwh. thermal, in the driest, year or 53 million kWH thermal in the average year. It will be observed that with the system absorbing 360 million kWH at present (roughly at 52 per cent.

load factor) there is a strong case for further Hydro Power with effect from 1966 if Thermal generation is to be avoided completely, and in fact, with a view to save burning imported fuel oil at Kelanitissa Power House, Government has already embarked on the construction of the Maskeliya Oya Project Stage I. However, the Kelanitissa Thermal Station will continue to fill an essential need for stand-by purposes, as well as for conservation of water, whenever the country suffers from periods of drought.

7. The Electrical Grid system has already been extended to Galle and Puttalam, whilst the system has also been linked with the Inginiyagala Power Station of 10,000 kW by the construction of a transmission line from Badulla to the Power Station there. At present then about one half of the Island is electrified. At Galle a clinker grinding plant will soon be under production, whilst the Puttalam Cement Factory is under construction. Apart from these large Industrial and Commercial loads, Government has been extending supply to rural areas to meet the needs of small consumers. In a short time also power would be used at the new Steel works at Oruwela and production would commence. Industrial and Commercial areas are developing south of Colombo at Ratmalana and also north of Colombo in the Ja-Ela area. Work has commenced on a multi-purpose scheme at Udawalawe and the Government network will in due course be extended to that area. When contracts for the extension of the 33kv net work are completed, the electricity supply would have extended to Matara, Hambantota, Deniyaya, Bibile and Moneragala.

Existing Transmission and Sub Transmission Facilities of the D. G. E. U.

The main transmission facilities consists of—

(*a*) 200·17 miles of 132 kV overhead line.
(*b*) 175·82 miles of 66 kV overhead line.
(*c*) 1,097·78 miles of 33 kV overhead line.
(*d*) 211·88 miles of 11 kV overhead line.
(*e*) 12·10 miles of 3·3 kV overhead line.

With the annexation of the Gal Oya Development Board to the D. G. E. U. the following transmission and sub transmission facilities would be added on to the Department—

(*a*) 91 miles of 33 kV line
(*b*) 76·75 miles of 11 kV line.

The Distribution facilities the D. G. E. U. consists of—

(*a*) 318·597 miles of low voltage overhead line.
(*b*) 203·068 miles of low voltage underground line.
(*c*) 44 primary 11 kV distribution substations with a transformer capacity of 137,070 kVa.
(*d*) 889 consumer substations with a transformer capacity of 209,538 kVa.

The G. O. D. B's distribution facilities are as follows :—

(*a*) 48·5 miles of low voltage overhead line.

(*b*) 116 consumer substations feeding 2,500 consumers with an aggregate capacity of 89·4 kVA.

The plant facilities available at the moment is as follows—

Plant Capacity	*General System kW*	*Jaffna System kW*	*G.O.D.B. System kW*
Hydro	100,000	—	11,000
New Steam	50,000	—	—
New Diesel at Pettah	12,000	—	—
New Diesel at Chunnakam	—	8,000	—
Total	162,000	8,000	11,000
Effective Plant Capacity less the single largest unit	25,000	2,000	2,750
	137,000	6,000	8,250

CHAPTER II

THE FORECAST OF LOAD REQUIREMENTS

Load Forecast

The Department's load forecast for the period 1966 to 1975 has been prepared on the following basis :

(*a*) The consumption by Domestic, Commercial and Local Authority licensees will reflect an annual increase of 6% from 1966 to 1969 and and increase of 8% from 1970 to 1975.

(*b*) The consumption by Plantation Industries and the medium sized industries will reflect an annual increase of 13% from 1966 to 1975. Many more tea factories have to be connected.

(*c*) The requirements of the following large Industries :

(1) Veyangoda Finishing plant	1,500 kW
(2) 2nd Textile Mill	6,000
(3) Gintota Plywood	500
(4) Steel Rolling Mills	13,000
(5) Tyre and Tube Factory	4,000
(6) Galle Clinker Plant	2,500
(7) Puttalam Cement Factory	6,000
(8) Russian Flour Mills	2,000
(9) Hardware Factory	1,500
(10) Hardboard Factory	1,000
(11) Colombo Harbour	2,000
(12) 2nd Ceramic Factory	1,000
(13) Municipal Water Works	1,500
(14) Ambatale Water Works	1,250
(15) Kandy Water Supply	1,500
(16) Galle M. C.	2,000
(17) Matara U. C.	1,000
(18) Weligama U. C.	1,000
(19) Puttalam U. C.	500
(20) Kankesanthurai Cement Works	5,000
(21) Dambulla	400
(22) Anuradhapura	1,000
(23) Medawachchiya	150
(24) Vavuniya	500

(25) Killinochi	500kW
(26) Paranthan Chemical Works	2,500
(27) Salterns	250
(28) Warakapola	250
(29) Morawaka	250
(30) Deniyaya	250
(31) Akuressa	250
(32) Hakmana	250
(33) Kamburupitiya	250
(34) Beliatta	250
(35) Tangalle	250

Fisheries Harbours :

(1) Beruwala	1,500
(2) Hambantota	1,500
(3) Kayts	1,500
(4) Kalpitiya	1,500
(5) Thondamannar	1,500
(6) Negombo	2,000
(7) Mannary I & II	3,000
(8) Arugambay	1,500
(9) Kokilai	1,500
(10) Trincomalee	9,000
(11) Galle	6,500
(12) Tangalle	250
(13) Mirissa	250

Plant Position

1968/69

Effective plant capacity available			153 MW
Units available :	Hydro	453	
	Steam	350	
	Diesel	103	
	Total		908 million units
Anticipated M.D.			168 MW
Units requirements :			
	Hydro	453	
	Thermal	342	
	Total		795 million units
Fuel Cost			Rs. 17,200,000

1969/70

Effective plant capacity available			223·5 MW
Units available :	Hydro	788	
	Thermal	435	
	Total		1,223 million units
Anticipated M.D.			188 MW
Unit requirements :			
	Hydro	788	
	Thermal	111	
	Total		899 million units
Fuel Cost			Rs. 3,550,000

1970/71

Effective plant capacity available without Samanalawewa 1st Unit			207·5 MW
Units available without Samanalawewa :			
1st Unit :	Hydro	788	
	Thermal	371	
	Total		1,159 million units
Anticipated M.D.			—
Unit requirements :			
	Hydro	788	
	Thermal	186	
	Total		974 million units
Fuel cost			Rs. 9,300,000

1971/72

Effective plant capacity available without Samanalawewa			207·5 MW
Units available without Samanalawewa :			
	Hydro	788	
	Thermal	371	
	Total		1,159 million units
Anticipated M.D			223 MW
Unit requirements :			
	Hydro	788	
	Thermal	292	
	Total		1,080 million units
Shortage of plant capacity			27·5 MW
Fuel Cost			Rs. 14,500,000
Annuity payment on 90 MW at Samanalawewa with a provision for 150 MW on the same repayment terms			11,193 million units
Annuity payment for the 90 MW plant ultimate development will be			Rs. 9,275,000
If Samanalawewa is not brought in 1970/71, the Department would have to pay a fuel bill of			Rs. 9,300,000

LOAD FORECAST IN MILLION UNITS*

	1965–66	1966–67	1967–68	1968–69	1969–70	1970–71	1971–72	1972–73	1973–74	1974–75
Normal Growth Less Industries ..	201·9	215·9	231·0	247·2	268·2	290·8	315·5	342·5	371·5	371·5
Plantation Industries and Industries ..	161·6	182·6	206·3	233·1	263·1	297·1	335·7	379·3	428·5	484·3
Total (i) ..	363·5	398·5	437·3	480·3	531·3	587·9	651·2	721·8	800·0	855·8
Veyangoda Add.	3·6	3·6	3·6	3·6	3·6	3·6	3·6	3·6	3·6	3·6
Pugoda	—	—	—	14·0	14·0	14·0	14·0	14·0	14·0	14·0
Gintota Plywood	—	·9	·9	·9	·9	·9	·9	·9	·9	·9
Steel Rolling Mills	—	8·0	8·0	8·0	8·0	8·0	8·0	8·0	8·0	8·0
Tyre Factory	—	—	12·0	12·0	12·0	12·0	12·0	12·0	12·0	12·0
Galle Clinker	2·6	5·2	5·2	5·2	5·2	5·2	5·2	5·2	5·2	5·2
Puttalam Cement	—	—	9·0	18·0	18·0	18·0	18·0	18·0	18·0	18·0
Flour Mills	—	—	—	7·0	7·0	7·0	7·0	7·0	7·0	7·0
Hardware Factory	2·5	2·5	5·0	5·0	5·0	5·0	5·0	5·0	5·0	5·0
Hardboard Factory ..	2·5	2·5	5·0	5·0	5·0	5·0	5·0	5·0	5·0	5·0
Colombo Harbour	—	—	5·0	5·0	5·0	5·0	5·0	5·0	5·0	5·0
2nd Ceramic Factory ..	—	2·7	2·7	2·7	2·7	2·7	2·7	2·7	2·7	2·7
Municipal Water Works ..	—	—	3·2	3·2	3·2	3·2	3·2	3·2	3·2	3·2
Ambatale Water Works ..	—	5·2	5·2	5·2	5·2	5·2	5·2	5·2	5·2	5·2
Other Industries	3·0	3·0	3·0	3·0	3,0	3·0	3·0	3·0	3·0	3·0
Total (ii) ..	14·2	33·6	67·8	97·8	97·8	97·8	97·8	97·8	97·8	97·8

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* These figures are subject to rerision.

LOAD FORECAST IN MILLION UNITS—*(contd.)*

	1965–66	1966–67	1967–68	1968–69	1969–70	1970–71	1971–72	1972–73	1973–74	1974–75
Kandy Add.	—	—	3·5	3·7	3·9	4·1	4·3	4·5	4·7	4·9
Galle M. C.	4·0	4·2	4·4	4·6	4·8	5·0	5·2	5·4	5·6	5·8
Matara U. C.	2·5	2·5	2·7	2·9	3·1	3·3	3·5	3·7	3·9	4·1
Others	2·0	2·0	2·0	2·0	2·0	2·0	2·0	2·0	2·0	2·0
Total (iii) ..	8·5	8·7	12·6	13·2	13·8	14·4	15·0	15·6	16·2	16·8
Jaffna	15·4	16·4	17·5	18·7	20·3	22·0	23·9	25·9	28·1	30·5
K. K. S. Cement	24·5	24·5	24·5	24·5	24·5	24·5	24·5	24·5	24·5	24·5
Total (iv) ..	39·9	40·9	42·0	43·2	44·8	46·5	48·4	50·4	52·6	55·0
Gal Oya Development Board (v) ..	19·3	20·6	22·0	23·5	25·5	27·6	30·0	32·6	35·4	38·4
Dambulla	—	—	—	—	1·0	1·08	1·17	1·27	1·37	1·48
Anuradhapura	—	—	—	—	3·0	3·25	3·52	3·82	4·14	4·50
Medawachchiya	—	—	—	—	·4	·43	·46	·50	·54	·60
Vavuniya	—	—	—	—	1·0	1·08	1·17	1·27	1·37	1·47
Killinochi	—	—	—	—	·4	·43	·46	·50	·54	·60
Paranthan Works	—	—	—	—	5·0	5·0	5·0	5·0	5·0	5·0
Salterns	—	—	—	—	·45	·49	·53	·57	·62	·67
Total (vi) ..	—	—	—	—	11·25	11·76	12·31	12·93	13·58	14·32
Fisheries (vii)	—	17·0	34·0	42·0	67·0	71·0	96·0	96·0	96·0	96·0
Grand Total	445·4	519·3	615·7	700·0	791·45	856·96	950·71	1027·13	1111·58	1174·12
Plus Losses	506	590·1	699·6	795·4	899·4	973·81	1080·30	1167·2	1263·0	

REQUIREMENTS AND AVAILABILITY*

Year	Yearly Load Factor Per Cent.	Million Units Required	Maximum Demand in MW	Million Units Available	Effective Plant Capacity available	+Surplus, —Shortage in Million Units and MW. of Plant Capacity	
						MW.	M. Units
1965/66 ..	53·9	506	107	908	153	+47	+409.6
1966/67 ..	54·1	590·1	124	908	153	+ 53	+327.7
1967/68 ..	54·3	699·6	147	908	153	+ 9	+219.3
1968/69 ..	54·6	795·4	168	908	153	– 9	+125
1969/70 ..	54·9	899·4	188	1,243	223·5	+39·5	+357.05
1970/71 ..	55·2	973·8	202	1,279	237·5	+40·5	+320.04
1971/72 ..	55·5	1,080·3	223	1,519	297·5	+79·5	+456.29
1972/73 ..	55·8	1,167·2	240	1,519	297·5	+64·5	+369.87
1973/74 ..	56·0	1,263·0	260	1,519	297·3	+49·5	+294.42
1974/75 ..	56·2	1,334·2	275	1,519	297·5	+31·5	+205.88

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* These figures are subject to revision.

PLANT CAPACITY AVAILABLE IN M. W. AND MILLION UNITS*

Plant	1965/66		1966/67		1967/68		1968/69		1969/70		1970/71		1971/72		1972/73		1973/74		1974/75	
	MW.	*Units*	*MW.*	*Units*	*MW.*	*Units*	*MW.*	*Units*	*MW.*	*Units*	*MW.*	*Units*	*MW.*	*Units*	*MW.*	*Units*	*MW.*	*Units*	*MW.*	*Units*
Hydro I, IIA & IIB	100	393	100	393	100	393	100	393	100	393	100	393	100	393	100	393	100	393	100	393
G.O.D.B.	10	60	10	60	10	60	10	60	10	60	10	60	10	60	10	60	10	60	10	60
Steam Grandpass (*a*)	50	350	50	350	50	350	50	350	50	350	50	350	50	350	50	350	50	350	50	350
Diesel Pettah (*b*)	12	63	12	63	12	63	12	63	12	63	Installed in 1957/58. Retired									
Diesel Chunnakam (*b*)	4	21	4	21	4	21	4	21	4	21	Installed in 1957/58. Retired									
Diesel Chunnakam (*b*)	4	21	4	21	4	21	4	21	4	21	4	21	4	21	4	21	4	21	4	21
Polpitiya	—	—	—	—	—	—	—	—	75	313	75	313	75	313	75	313	75	313	75	313
Udawalawe	—	—	—	—	—	—	—	—	6	22	6	22	6	22	6	22	6	22	6	22
Samanalawewa	—	—	—	—	—	—	—	—	—	—	30	120	30	120	30	120	30	120	30	120
Samanalawewa	—	—	—	—	—	—	—	—	—	—	—	—	60	240	60	240	60	240	60	240
	180		180		180		180		261		275		335		335		335		335	
Less	27		27		27		27		37·5		37·5		37·5		37·5		37·5		37·5	
Effective	153	908	153	908	153	908	153	908	223·5	1,243	237·5	1,279	297·5	1,519	297·5	1,519	297·5	1,519	297·5	1519

* These figures are subject to revision.

(*a*) At 80% yearly load factor.

(*b*) At 60% yearly load factor.

CHAPTER III

THE FIVE-YEAR PLAN

From the load forecast it will appear that the Department would have to generate 342 million units in the year 1968/69 to meet the system requirements. This would cost the Department approximately Rs. 17 million as fuel bill. It is to meet this situation that the Department decided to proceed on Maskeliya Oya Stage I Project. This would provide 75,000 KW and 313 million units annually.

Tenders for the construction of these projects have already been awarded.

In order to utilise the power that will be generated from the existing power stations and the Maskeliya Oya Project, extensive transmission facilities costing approximately Rs. 116 million have been planned. Tenders for the provision of these facilities have already been called for and is due to close in early March. A detail description of these facilities are given in the body of this report.

A similar situation will be created in 1971/72 when the Department would be compelled to generate 371 million units from thermal sources to meet the requirements of the system. If these units are to be met from thermal sources the Department would have to meet a fuel bill of approximately Rs. 14.5 million.

This situation can be economically met if a hydro station is brought into commission. There are two alternative hydro schemes available to the Department. They are :—

(*a*) Samanalawewa Multi-purpose project

(*b*) Maskeliya Oya Stage II and III.

A description of these two schemes with associated transmission facilities is given in the body of this report. If Samanalawewa is brought into operation in 1970/71, the envisaged shortage in KW and unit requirements would be adequately and more economically met.

To meet the power requirements thereafter a further hydro scheme will have to be brought into commission. The choice will therefore be between Stage II and III of the Maskeliya Oya Project or Mahaweli Multi-purpose Diversion Project.

Preliminary investigation report on Maskeliya Oya Project Stage II and III has been already obtained from Hydro Technic Corporation and Engineering Consultants of Colorado. It is now therefore necessary to prepare detail plant specifications if the construction of this scheme is to be taken no sooner the Samanalawewa Scheme is completed.

MASKELIYA OYA PROJECT

Power

The head water streams of the Kelani Ganga originate on slopes of the mountainous areas of South-Central Ceylon. In this area, the rainfall amounts to over 150 inches per year and the streams drop steeply through the two main branches of the Kelani, the Kehelgamu Oya and the Maskeliya Oya. These two tributaries run parallel to each other in a north-westerly for a distance of some 25 miles and join at a relatively flat area at Broadlands. The Kehelgamu Oya is fully developed and its waters are diverted to the existing Laksapana Power plant on the Maskeliya Oya, and are available for further downstream uses.

Favourable storage conditions exist on the Maskeliya Oya at about elevation 3,800 near Mousakelle and a gross head of about 3,100 feet is available for development between this point and Broadlands. (The primary object of the Maskeliya Oya Project is to develop the maximum amount of energy under the above conditions in the most economical manner).

United Nations Technical Assistance Administration's Feasibility Report

General plans for the development of the Maskeliya Oya have been studie by the Department of Government Electrical Undertakings for several years with the assistance of the U.N.T.A.A. In 1956 Mr. H. P. Pfeifer, U.N.T.A.A. representative who was associated with the Department of Government Electrical Undertakings proposed the "Seven Virgins Project" located in the upper Maskeliya Oya and recommended its further investigations.

Further Investigations by the International Co-operation Administration

In 1957, the Ceylon Government requested technical assistance from the Government of United States for the investigation of the "Seven Virgins Project". In response to this request, the International Co-operation Administration contracted with the Tudor Engineering Company to make reconnaissance of the project, and a report entitled "Hydro-Electric and Irrigation Projects—Seven Virgins and Samanala Wewa, Ceylon" was submitted by this Company.

The Tudor Report recommended that an engineering survey be made to establish the feasibility of the Seven Virgins Project and to advise on the full potential and orderly development of the Kelani Ganga.

To implement this recommendation I. C. A. contracted with Hydrotechnic Corporation and Engineering Consultants Inc. as a joint Venture to investigate and report on the Seven Virgins Project. The results of this investigation contained in a report dated June 1960, were that the Seven Virgins scheme did not offer the most economical or practical plan for the development of the Maskeliya Oya's power resources, and was, therefore, replaced by a three-stage scheme, the Maskeliya Oya Development program, which briefly consists of :—

(*a*) *Mousakelle Unit.*—This is the main storage unit for the Project and consists of an earth dam 132 feet high to create an active storage reservoir of 80,000 acre feet capacity. The inundated ground consists in part of some excellent tea producing areas and the townships of Maskeliya and Kintyre. As a consequence, land acquisition cost are high and about 10 miles of road relocation is necessary.

(*b*) *Theberton Unit.*—The Theberton Unit consists of a 7 foot diameter steel conduit in the form of an inverted siphon and a concrete lined canal of 400 c.f.s. capacity. The total length of conveyance line is about 18,400 ft. extending from the Mousakelle storage reservoir to a regulating forebay at the head of a penstock leading to a power plant under a head of 890 ft.

Two 11,250 Kw generating units are proposed for the power plant.

When all plants of the Project are in operation water will be released from Mousakelle Reservoir through the Theberton plant or it may be released directly into the river in sufficient quantities to maintain a regular daily discharge (including inflow from the catchment area below the reservoir) through the Laksapana plant. Thus the method of operation of the Theberton plant may be changed from month to month depending on load circumstances but it will usually be operated on the base of the load.

(*c*) *Laksapana Unit.*—Water discharged from the Theberton plant or through the dam at Mousakelle plus the river inflow of the drainage area below the Mousakelle dam will be collected in a regulating reservoir having a 520 acre-feet of usable capacity at elevation 2,860. This reservoir will be created by a rock fill dam 73 feet high.

Water to be used for power will be conveyed to a forebay reservoir with a capacity of 20 acre feet, and located approximately half a mile south of the surge chamber of the existing Laksapana plant. From this forebay penstocks will lead to the power house extension, upstream of the present structure.

The upstream extension of the existing Laksapana power house will permit the installation of additional generating units and the use of present facilities. These additional units operating under a net head of 1,495 feet will have a total capacity of 75,000 kW.

(*d*) *Morahena Unit.*—The principal features of this unit consists of a diversion dam of the rock fill type 61 feet high across the Maskeliya Oya a short distance below the Laksapana power plant ; a conveyance of 1,250 c.f.s. capacity leading to the power plant forebay and a power plant having an installed generating capacity of 50,000 kW. The Morahena power plant is located about 3 miles downstream from the Laksapana power plant. Two generating units of 25,000 kW each will operate under a head of 578 feet.

The diversion dam will create a small regulating reservoir which will collect the water discharged from the existing Laksapana power plant and from the proposed extension of this plant and also the natural inflow from the drainage area below the Laksapana diversion dam. All of this water will be available for the operation of the Morahena Power Plant.

In a supplementary report dated July 1961 the International Co-operation Administration of the U. S. A. recommended that the power plant earlier proposed at Morahena be shifted further downstream to Polpitiya where the effective head of the plant will be increased such that the total capacity of the power plant can be increased to 75,000 kW.

Maskeliya Oya Project Stage I

After reviewing the above reports, the Government of Ceylon authorised the Department of Government Electrical Undertakings to implement the Mousakelle dam and the Polpitiya power plant together with its associated storage facilities and transmission system convertions. This portion of the project forms Maskeliya Oya Project, Stage I.

At about this time, a Canadian firm of Consulting Engineers, Messrs Ingledow Kidd & Associates Ltd., offered their services as well as assistance in negotiating a long term loan from the Canadian Government to finance the foreign cost of the Maskeliya Oya Project, Stage I. As a result of preliminary discussions held between Messrs Ingledow Kidd & Associates Ltd., and the Government of Ceylon, the Consulting Engineers acting on behalf of the Government of Ceylon applied for long term financing to the Export Credits Insurance Corporation which is a Canadian Crown Corporation. This application was approved by the Canadian Government in January, 1962, and by the Ceylon Government in March. Detailed contract negotiations then proceeded, leading to the ratification of the formal agreements on 26th April, 1963. These agreements provide an amount of £10,800,000 in Canadian funds for the financing of the engineering and equipment for the project. Simultaneously two other agreements, one with Messrs Ingledow Kidd & Associates Ltd. for the engineering of the project and the other with Messrs Canadian General Electric Co., Ltd., of Canada as the Prime Supplier were entered into by the Ceylon Government. The validity of these three agreements are inter dependent.

Negotiations on these agreements had advanced sufficiently by mid October, 1962 to permit the detailed site investigations and engineering studies of the Maskeliya Oya Project, Stage I to proceed, which resulted in the report dated June, 1963 submitted by Messrs Ingledow, Kidd & Associates Ltd., to the Department of Government Electrical Undertakings.

The salient features of this report are :—

(i) The necessity for commissioning additional generating capacity early in 1967.

(ii) The average power generation at Polpitiya will cost 3·2 cts. per unit and that the Stage I of the Maskeliya Oya Project is technically sound and prudent and can be commissioned to meet the requirements on an economic basis.

(iii) The Polpitiya power plant should comprise two 37,500 kW units.

(iv) Only a loop connection into the existing Laksapana/Colombo 132 kV is required.

(v) The total cost of the project will amount to Rs. 150,088,000 of which Rs. 47,782,000 represent the foreign cost.

(vi) The construction of access roads and certain complementary works be commenced immediately as scheduling requirements for the construction of the project are critical.

The main features of the Project as described in the report from Messrs Ingledow Kidd & Associates Ltd., are :—

The Mousakelle Dam and Reservoir,

The Polpitiya diversion dam,

The Polpitiya Power Conduit, and

The Polpitiya Power Plant, Switchyard and associated electrical works.

The relative locations of the Maskeliya Oya Project, Stage I development and existing plants together with the contributing drainage areas are shown in fig. 2.

Project Features

(i) MOUSAKELLE DAM :

Impounding of water at Mousakelle reservoir will be effected by the dam across the Maskeliya Oya which will be located where the river leaves the open flats of Kintyre at Mousakelle. Although an earth fill dam had earlier been proposed the information obtained in the extended foundation investigations carried out subsequently shows that a concrete structure is better suited to this site. The overall economics led to the adoption of a concrete gravity structure.

The crest length of the concrete dam will be 615 feet and it will rise to a height of 115 feet above foundation level. The spillway will discharge flood waters directly into the river channel downstream, the flow being controlled by three radial crest gates. In addition to the main dam, three dykes will be constructed along the rim of the reservoir as shown in Fig. 2.

The Mousakelle dam will impound 88,000 acre feet of stored water between the normal maximum operating level of 3,830 feet and the normal minimum operating level of 3,758 feet. An allowance of 8,000 acre feet has been made for silting of the reservoir to provide storage of sediment which would be deposited over seventy-five years if all the material eroded over the whole Mousakelle drainage area is transported to the reservoir.

The overfloor spillway section will consist of three 35 foot wide spillways, each equipped with a 35×15 foot radial crest gate with its hoist mechanism on a supplementary bridge spanning the spillway opening. The spillway crest will be at an elevation of 3,815 and the top of the gate at elevation 3,830 which will enable the required flood flow of 46,000 c.f.s. to pass, the water level in the reservoir being at elevation 3,840.

A stilling pool of the sloping apron type will dissipate the energy of the water.

The permanent outlet work is located on the right bank side of the spillway and consists of an eight foot diameter steel conduit and a bifurcation, one leg of which will be capped. The other leg will contain a free discharge valve which will control releases down the river and will discharge 800 c.f.s. at normal minimum operating level. The capped leg of the bifurcation will become the intake for the future Theberton power conduit. At the upstream end of the outlet work a fixed wheel gate operated by a hoist will be installed. The valve and gates will be electrically operated. The gate position, valve position and the water level will be telemetered and transmitted to the Laksapana power plant using VFH equipment.

A permanent roadway 22 feet wide will run along the dam crest and continue across the dykes replacing the road which will be inundated.

(ii) POLPITIYA DIVERSION DAM :

The Polpitiya Diversion Dam will be located on the Maskeliya Oya 700 feet downstream of the existing Laksapana power plant. The function of the dam is to divert flows from the Maskeliya Oya and out flows from the Laksapana Power plant into the Polpitiya power tunnel ; and to provide limited pondage for short period flow regulation. With a height of 100 ft. from foundation to crest level, the structure will be of concrete gravity design with a crest length of 430 feet ; of this 115 feet will be of gated spillway section ; 55 feet of free overflow section and the remainder non-overflow section.

The dam will provide a pondage of 115 acre feet which will be sufficient to regulate hour to hour fluctuations in flow to meet demand required at the Polpitiya power plant as shown in fig. 3.

The gated spillway section will have three openings at a crest elevation of 1,233 feet designed to pass a total of flood flow of 56,000 c.f.s. Control will be provided by three radial gates 315 feet wide and 24 feet high.

The free overflow section which will have a sill at an elevation 1,254 (three feet below the top of the radial gates) will pass a limited amount of surplus water over the dam without operating the spillway gates.

The Polpitiya tunnel intake works will be located about 250 feet upstream of the dam on the right bank of the river. The intake is of conventiona tower design, rising 55 feet from the invert, at an elevation of 1,215 to th hoist structure deck. One fixed wheel gate, approximately 15×13 ft., and one bulkhead gate will be installed. A bridge will provide access to the tower from the main road.

The gates at the dam and intake structure will be electrically operated and remote controlled from the Laksapana power plant. Gate position and water level indications will be registered at the Laksapana control room and will also be transmitted by means of carrier to the Polpitiya power plant for the assistance of local control operators.

(iii) POLPITIYA POWER CONDUIT :

The Polpitiya power conduit will be 25,400 feet in length and its present alignment is expected to give sufficient sound rock cover. Two adits, which in addition to the two portals will provide six working faces.

An unlined tunnel cross-section will generally be employed and altered only where local rock conditions dictate the need for concrete lining. The optimum tunnel size has been determined as 15·5 feet inside the minimum line of excavation.

(iv) SURGE TANK :

The Polpitiya surge tank is a simple shaft located on the tunnel line approximately 700 feet from the downstream portal. The tank will be lined only in the weathered zones and in sound rock the lining is omitted. With an internal diameter of 21 feet the tank will have adequate height to contain the expected surge and the damping characteristics are within acceptable limits.

(v) PENSTOCKS :

The downstream portion of the tunnel between the surge tank and portal will have a steel liner 11.5 feet in diameter throughout its length which will terminate in a bot-type section from where two steel penstocks, one for each unit will lead into the valve house.

The valve house will accommodate a butterfly valve for each penstock, operated by oil under pressure. Accumulator tanks will be supplied with sufficient storage to actuate two closures and two opening cycles of each valve in the event of compressor failure. Suitable air valves are provided at this location to mermit filling and draining the penstocks. Each penstock is provided with a turbine inlet valve at its lower and within the powerhouse. The penstock line is divided into three reaches with diameters of 7.5 feet, 6.75 feet and 6.5 feet respectively. The pressure diagram for the penstocks is shown in Fig. 4. The penstocks will be supported on re-inforced concrete saddles and mass concrete anchors will be provided at bend locations. Expansion joints of the sliding type will be installed in each section between anchors.

(vi) POLPITIYA POWER PLANT :

The Power House is located on the right bank of the Maskeliya Oya about half a mile upstream of its confluence with the Kehelgamu Oya. The installed capacity of 75,000 kW will be supplied by two 37,500 kW generators each driven by a 52,400 horsepower Francis turbine. Two banks of single phase 14,733 kVA transformers will be installed behind the power house and connected to the switchyard located on the river bank adjacent to the tail race channel. Switchyard facilities will be provided to feed the output from the generators into Laksapana-Colombo 132 kV Transmission Line.

Two 37,500 KW Generators feed the Switchyard shown in the single line diagram at Fig. 5, through 2,500 ampere generator breakers and seperate 12.5 kV generator buses.

The turbine hall will be approximately 120 feet long and 50 feet wide with units spaced at 40 feet centres. The overall height of the power station from foundation level to the roof will be approximately 100 feet. The powerhouse equipment and steel structures are being supplied by Canadian General Electric Company Ltd., who will also supervise the erection of this equipment by the Civil Engineering Contractors.

The main features of the electrical and mechanical equipment are as follows :—

(i) Generators

The two vertical generators will be 12 pole, 46,900 kVA, 0.80 power factor, 37,520 kW, 500 R. P. M., 12,500 volts, 3 phase 50 Cycle, 2,166 amps, enclosed water cooled, with thrust bearings located above the rotors. The line charging capacity is 44,000 KVAR and the stator and rotor temperature rise sbove ambiant does not exceed 60°C. Over load capacity is 53,900 KVA with a temperature rise not exceeding 80°C. The allowable overspeed is 830 RPM. The efficiency of the generator at full load, 0.8 p.f. is 97.01%.

The stator will be split into three sections for shipment and the stator winding will have Class B insulation with insulated steel coil support rings.

The rotor will rotate clockwise when viewed from above and the shaft will be 20 inches diameter above the coupling flange. A combined thrust and guide bearing will be provided to carry the weight of rotating parts. The bearing is capable of operating without injury at rated speed and load for 15 minutes without cooling water. With normal cooling water, it can operate without injury at any speed from 5% of normal to runaway speed. Combined air operated breakes and oil operated jacks will be fitted, and the breake can bring the rotor to a standstill in 5 minutes from 20% rated speed. Th totally enclosed self ventilating generator cooling air system shall consis of 8 surface air coolers around the generator frame, with water supplied t the coolers at a pressure not exceeding 50 p.s.i.

The exciters are rated at 125 volts, 160 and will be direct coupled to th generator and mounted on top of the generator housing. An amplidyne M set serves as the power amplification stage of the voltage regulator equipmen which can keep the generator terminal voltage at any present level betwe

11·25 and 13·75 kV, divide the reactive KVA load proportionately between the two units operating in parallel and limit rise of terminal voltage to 105% of initial voltage encountered on load rejection.

(ii) Protection and Control Equipment

A duplex type switchboard 90" high, 60"deep and 14 feet long will be installed in the Power House for protection and control purposes. The power house will be normally controlled by supervisory equipment over a carrier system from the remote master station at Laksapana Power House.

A comprehensive protection system will be installed for protection of the turbine, generator, transformer and transmission lines. The indicating and control devices will be mounted on front of the control panel, with the relays on the rear panel.

(iii) Supervisory and Telemetering Equipment

The Supervisory and Telemetering Equipment is for remote control of the Power House from Laksapana. It will provide the following functions and indications at Laksapana Power House :

(*a*) Supervisory control *via* power line carrier.
(*b*) Continous telemetering of station megawatts and megavars.
(*c*) Telemetering of Polpitiya Pond water level,
(*d*) Telemetering of Polpitiya spillway gate opening,
(*e*) Telemetering of Polpitiya intake gate opening,
(*f*) Telemetering of Mousakelle spillway gate opening,
(*g*) Telemetering of opening of Mousakelle discharge valve,
(*h*) Telemetering of Mousakelle water level, and
(*i*) Telemetering of Mousakelle intake gate position.

(iv) Carrier Communication Equipment

Power line carrier communication equipment will be installed to tie up with the existing Departmental network. The equipment will provide telephone dialing, voice, relaying (directional comparison), supervisory and telemetering channels in both directions between Polpitiya and Laksapana Power House.

Bypass audio tone channel relaying signals for the line protection of the Laksapana Kolonnawa Line will also be provided. A 9 line private automatic exchange with 2 connections will be installed at Polpitiya Power House.

(v) Main Station Service

A. C. Station Service is provided by two type LNS 12·5 kV/400 volt, 300 kVA, 3 phase self cooled transformers. Distribution of power to the various circuits is through a dead front switchboard.

230 volt D. C. Station Service is provided by a lead-acid pasted plate type battery of cells providing a nominal voltage of 230, with a capacity of 301 ampere hours. A 24 volt lead acid storage battery of 54 ampere hour capacity will be provided for the communication circuits.

(vi) Station Service Standby Generating Set

Standby power will be delivered by a 35 kW, 0·8 PF, 1,500 RPM, 400 Volt generator driven by a water cooled Dorman diesel engine with self-contained radiator.

(vii) 12·5 kV Switchgear

Each generator circuit breaker is rated at 13·8 kV. 2,500 amperes, with a symmetrical interrupting capacity of 500 MVA at 12·5 kV. It will be of metal clad construction.

Power Transformers

Seven single phase power transformers (one spare) will be supplied. Each unit is rated at 17,900 kVA, 55 degree C rise, type OFW, high voltage 76/200, 132,000 volts grounded wye, 12,000 volts low voltage delta, outdoor type. Cooling will be by means of a forced oil water cooled heat exchanger. It will be fitted with four off load taps.

Grain oriented cold rolled steel will be used for the core. The HV windings which are shielded, will be of continuous disc construction and the LV windings will be of helical construction. The efficiency at full load is 99·32%.

132 kV Switchyard

The present contract provides for a five bay switchyard which will beed into one circuit of the existing Laksapana Kolonnawa 132 kV line which will be looped into the Switchyard with the other bays connected to the two generators and the bus coupler. However, it is proposed to call for tenders to extend the switchyard by a further six bays and instal circuit breakers capable of single and three phase auto reclosing. The switchyard will then be re-arranged so that the six bay extension will feed two Jaffna lines, two Kolonnawa lines and two new lines to Laksapana lines and connect to the generators and bus coupler.

The five bay switchyard will consist of five single tank, three phase, 138 kV, 3,500 MVA, 800 ampere, bulk oil circuit breakers. It will have a pnuematic type operating mechanism capable of five closing operations without compressor assistance. It can be uprated to 5,000 MVA with minor changes. The breakers have 4·17 cycle fault clearing time, 17 cycle reclosing time and are outdoor, floor mounted.

Twelve bushing type current transformers (2 per bushing) will be installed on each breaker.

Fourteen manually group operated disconnect switches rated at 600 amperes will be installed. They will be fitted with Kirk type interlocks. Ground switches will be fitted on those disconnects which feed transmission lines.

Seven 132 kV Potential Transformers (one spare), single phase, cascade type will be connected to the 132 kV main and reserve bus bars. Coupling capacitors will be connected to the lines for carrier coupling, synchromising and protection circuits.

The duplicate busbars will have a Main Reserve arrangement.

One circuit of the existing 132 kV Laksapana Kolonnawa transmission line will be looped in and out of the switch yard.

Turbine and Governors

The turbines will be supplied by Dominion Engineering Works Ltd. The two Francis units are each of 52,400 horse power at 770 feet net head, 500 RPM. The runner is of stainless steel for maximum resistance to erosion. The turbines are fitted with babitt-lined guide bearings. permanent magnet generators and other accessories. The turbine efficiency is expected to exceed 92% at full output under a net effective head of 866 feet.

Each turbine will be fitted with a Woodward cabinet actuator type governor, capable of opening or closing the wicket gates in 7½ seconds under all operating conditions. The governor will be capable of sensing and governing speed changes of 0·01% of normal speed without hunting. An automatic shut down device will close the turbine gates at normal rate of closure on operation of any of the automatic protective features.

The turbine inlet valves will be spherical type with a diameter of 56 inches' with a 4 inch by pass. Each will weigh 81,000 lbs.

The penstock valves will be 96 inches in diameter with a 12 inch bypass. Each will weight 72,000 lbs.

Miscellaneous Equipment

A power house travelling bridge crane will be installed with a capacity of 105/15 tons. It will be a cab controlled electric overhead travelling crane with a span of 41 feet.

The transformer bays and switchyard will be fitted with Mulsifyre fire protection devices spraying water which is obtained through valves from the penstocks.

The three cooling water pumps will be powered by 75 HP motors and the draft tube de-watering pump will be driven by a 60 HP motor.

An air compressor plant will supply 160 c.f.m. at 110 p.s.i. consisting of two Atlas Copco compressors.

A mobile oil conditioner with a capacity of 500 g.p.h. and a 1,700 gallon storage transfer tank will be provided.

Ventilating equipment with fans will provide a minimum of 5 air changes per hour in the power house.

All structural steel for the Power House switchyard and transmission towers will be supplied by Bridge and Tank Co., Ltd. of Canada. The total weight of steel required will be 434,000 lbs. The design stress of the steel is 20,000 p.s.i.

Contractors

The work involved in constructing and commissioning Stage I of the Project is divided into five separate contracts.

Contract No. 1.—(General Civil Works)—consists of the construction of all the civil works for the Project other than those covered by Contract No. 5—viz : (i) the Mousakelle Dam which will be a concrete gravity dam with a crest length of 615 feet and height of 115 feet. This dam will impound 88,000 acre feet of water i.e. twice the quantity of water impounded by the Castlereagh dam in the adjacent valley. (ii) The Polpitiya Diversion Dam, which will also be a concrete gravity dam with a crest length of 430 feet and height of 100 feet. This dam will be some what larger than the Dam at Norton Bridge. (iii) The Polpitiya Power House which is 120 feet long, 50 feet wide and 100 feet high. (iv) All the civil works connected with the installation of the Steel Penstocks and (v) the erection of all equipment supplied under Contracts Nos. 2 and 3.

This contract has been awarded to Messrs Ingra of Yugoslavia at a total cost of Rs. 64 millions of which Rs. 28 million represent the foreign cost.

Contract No. 2.—(Dam Gates and Hoists)—consists of the supply and supervision of erection of all the gates, hoists and associated electrical equipment at Mousakelle and Polpitiya Dams.

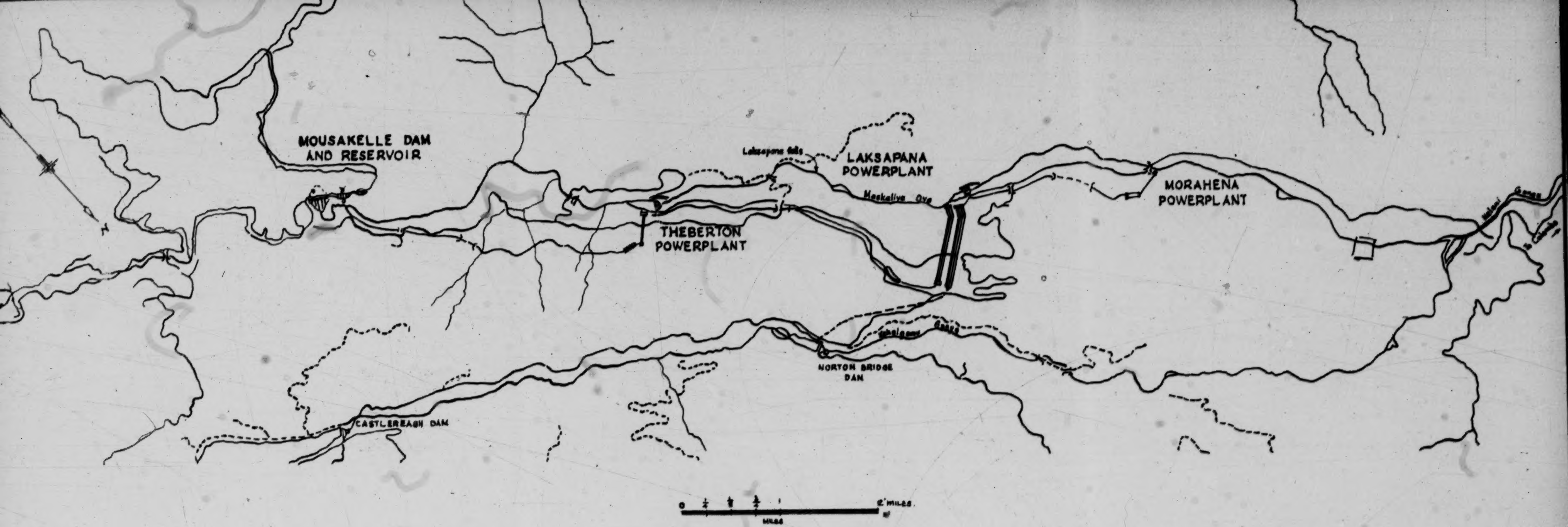
This contract has been awarded to Messrs Canadian Iron Foundries Ltd., of Canada at a total cost of Canadian $ 526,404 equivalent to Rs. 2,342,500.

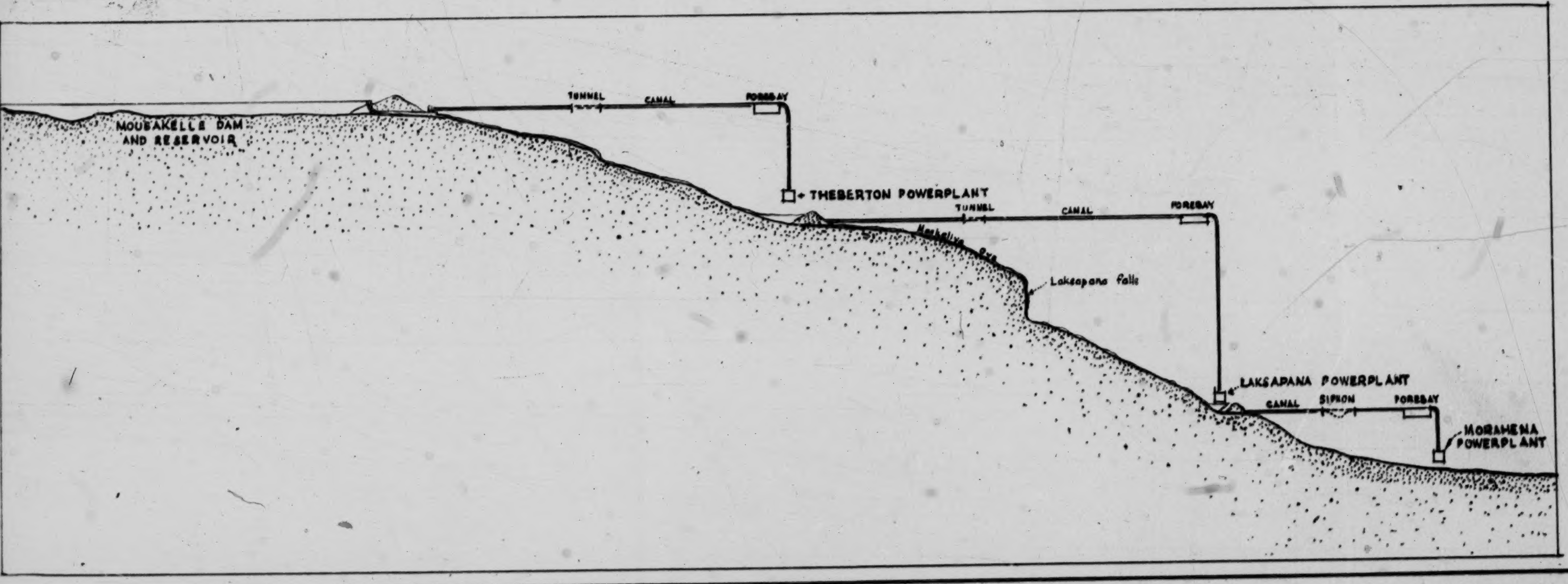
Contract No. 3.—(Equipment and Steel Structures for Polpitiya Power House and Related Works)—consist of the supply and supervision of erection of the bulk of the equipment for the project, including all Power House and switchyard equipment and steel structures, together with carrier and supervisory electrical equipment for both dams.

This contract has been awarded to Messrs Canadian General Electric Co. Ltd., of Canada at a cost of Canadian $ 3,987,262 equivalent to Rs. 17,743,760.

Contract No. 4.—(Supply and Erection of Polpitiya Penstocks)—consists of the supply and erection of Polpitiya Penstocks 7½ feet in diameter and tunnel liner, the civil works portion of which will be carried out under Contract No. 1.

This contract has been awarded to Messrs Vancouver Iron & Engineering Works Ltd., of Canada at a total cost of Rs. 5,472,280 of which Canadian $ 926.265 represents the foreign cost.


MOUSAKELLE DAM
AND RESERVOIR
Laksapana falls
LAKSAPANA
POWERPLANT
THEBERTON
POWERPLANT
Maskeliya Oya
MORAHENA
POWERPLANT
Kelani Ganga
to Colombo
Kehelgamu Ganga
NORTON BRIDGE
DAM
CASTLEREAGH DAM
N
0 ¼ ½ ¾ 1 2 MILES
MILES


MOUSAKELLE DAM
AND RESERVOIR
TUNNEL
CANAL
FOREBAY
THEBERTON POWERPLANT
TUNNEL
CANAL
FOREBAY
Maskeliya Oya
Laksapana falls
LAKSAPANA POWERPLANT
CANAL
SIPHON
FOREBAY
MORAHENA
POWERPLANT

MAP
OF
MASKELIYA OYA PROJECT

FIGURE · 1 ·

Printed by Survey Dept., Ceylon. Oct. 1966

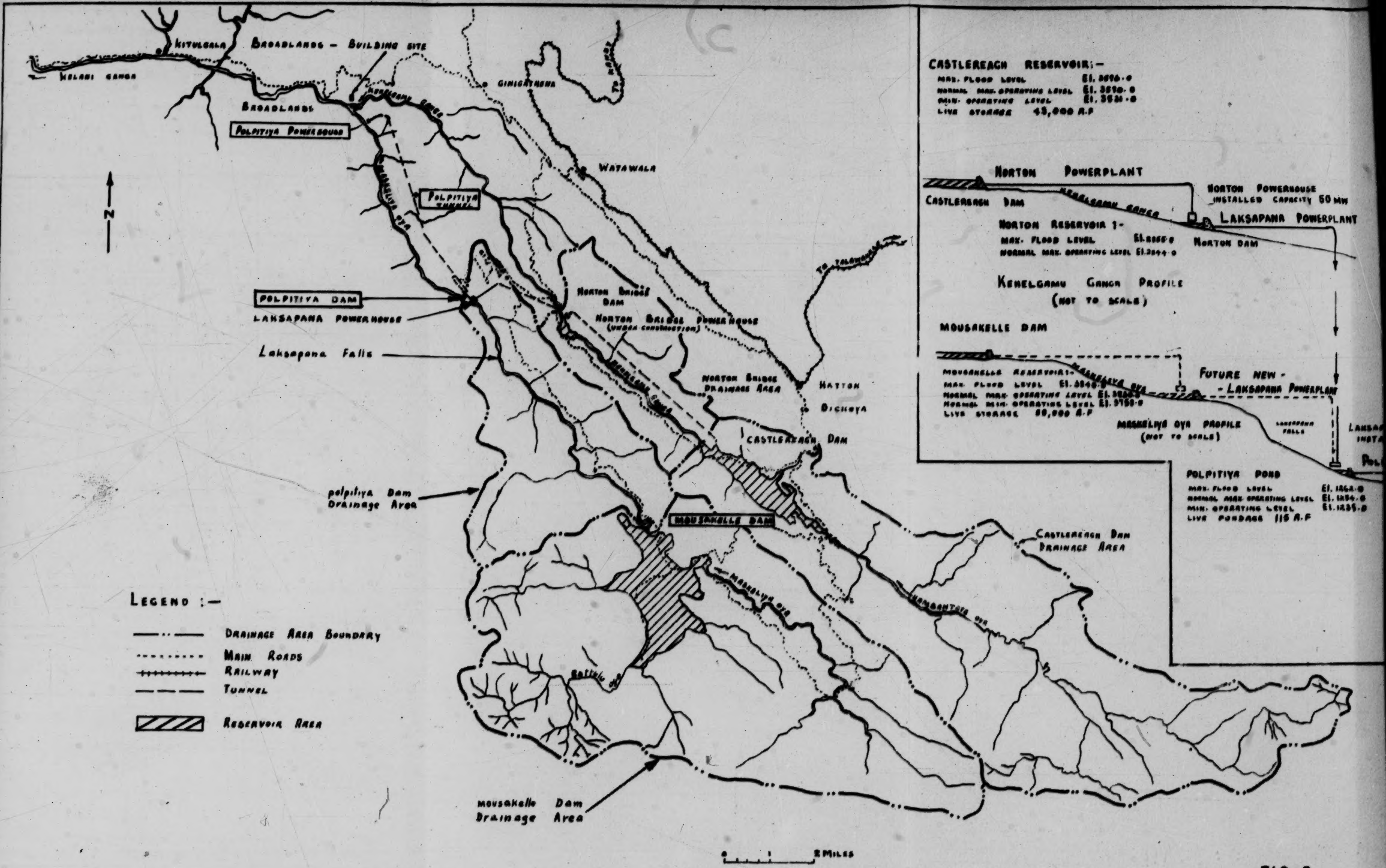
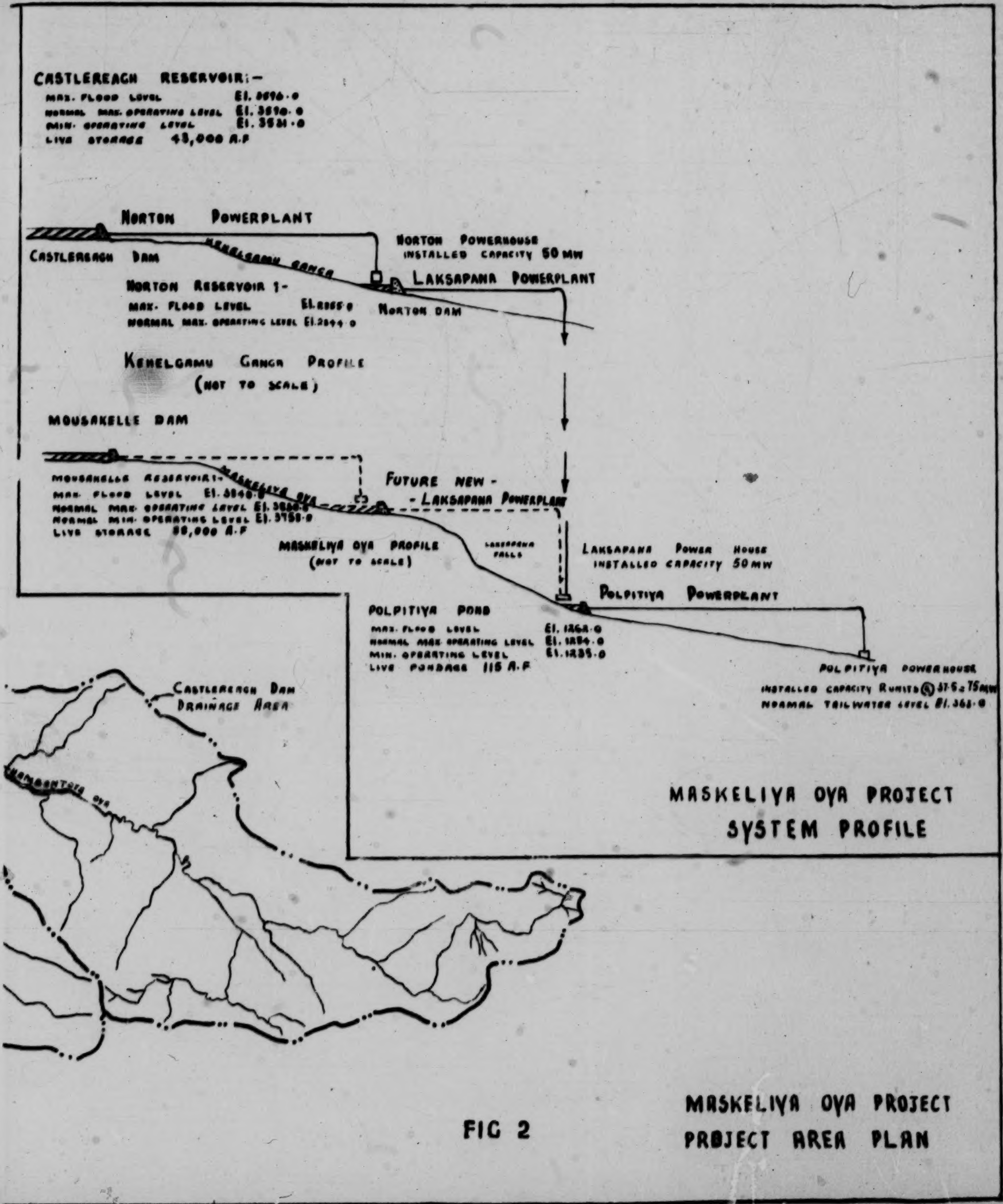

Kitulgala
Broadlands - Building site
Kelani Ganga
Broadlands
Ginigathena
To Kandy
Kehelgamu Ganga
Polpitiya Powerhouse
Watawala
N
Maskeliya Oya
Polpitiya Tunnel
Polpitiya Dam
Laksapana Power House
Norton Bridge Dam
Norton Bridge Power House
(under construction)
Laksapana Falls
Kehelgamu Ganga
Norton Bridge Drainage Area
Hatton
To Talawakele
Dickoya
Castlereagh Dam
Polpitiya Dam Drainage Area
Mousakelle Dam
Castlereagh Dam Drainage Area
Maskeliya Oya
Kehelgamu Oya
Mousakelle Dam Drainage Area
2 Miles
Legend :-
Drainage Area Boundary
Main Roads
Railway
Tunnel
Reservoir Area
Castlereagh Reservoir:-
Max. Flood Level El. 3896.0
Normal Max. Operating Level El. 3890.0
Min. Operating Level El. 3831.0
Live Storage 43,000 A.F
Norton Powerplant
Castlereagh Dam
Kehelgamu Ganga
Norton Powerhouse
Installed Capacity 50 MW
Laksapana Powerplant
Norton Reservoir :-
Max. Flood Level El. 2856.0
Normal Max. Operating Level El. 2844.0
Norton Dam
Kehelgamu Ganga Profile
(Not to scale)
Mousakelle Dam
Mousakelle Reservoir:-
Max. Flood Level El. 3846.0
Normal Max. Operating Level El. 3830.0
Normal Min. Operating Level El. 3753.0
Live Storage 80,000 A.F
Maskeliya Oya
Future New - Laksapana Powerplant
Maskeliya Oya Profile
(Not to scale)
Laksapana Falls
Laksa
Insta
Pol
Polpitiya Pond
Max. Flood Level El. 1262.0
Normal Max. Operating Level El. 1254.0
Min. Operating Level El. 1235.0
Live Pondage 115 A.F

FIG 2


CASTLEREAGH RESERVOIR:-
MAX. FLOOD LEVEL El. 3596.0
NORMAL MAX. OPERATING LEVEL El. 3590.0
MIN. OPERATING LEVEL El. 3531.0
LIVE STORAGE 43,000 A.F
NORTON POWERPLANT
CASTLEREAGH DAM
KEHELGAMU GANGA
NORTON POWERHOUSE
INSTALLED CAPACITY 50 MW
LAKSAPANA POWERPLANT
NORTON RESERVOIR :-
MAX. FLOOD LEVEL El. 2855.0
NORMAL MAX. OPERATING LEVEL El. 2844.0
NORTON DAM
KEHELGAMU GANGA PROFILE
(NOT TO SCALE)
MOUSAKELLE DAM
MOUSAKELLE RESERVOIR:-
MAX. FLOOD LEVEL El. 3846.0
NORMAL MAX. OPERATING LEVEL El. 3838.0
NORMAL MIN. OPERATING LEVEL El. 3758.0
LIVE STORAGE 88,000 A.F
MASKELIYA OYA
FUTURE NEW -
- LAKSAPANA POWERPLANT
MASKELIYA OYA PROFILE
(NOT TO SCALE)
LAKSAPANA FALLS
LAKSAPANA POWER HOUSE
INSTALLED CAPACITY 50 MW
POLPITIYA POWERPLANT
POLPITIYA POND
MAX. FLOOD LEVEL El. 1262.0
NORMAL MAX. OPERATING LEVEL El. 1254.0
MIN. OPERATING LEVEL El. 1235.0
LIVE PONDAGE 115 A.F
POLPITIYA POWERHOUSE
INSTALLED CAPACITY 2 UNITS @ 37.5 = 75 MW
NORMAL TAILWATER LEVEL El. 363.0
CASTLEREAGH DAM
DRAINAGE AREA
OYA

MASKELIYA OYA PROJECT
SYSTEM PROFILE

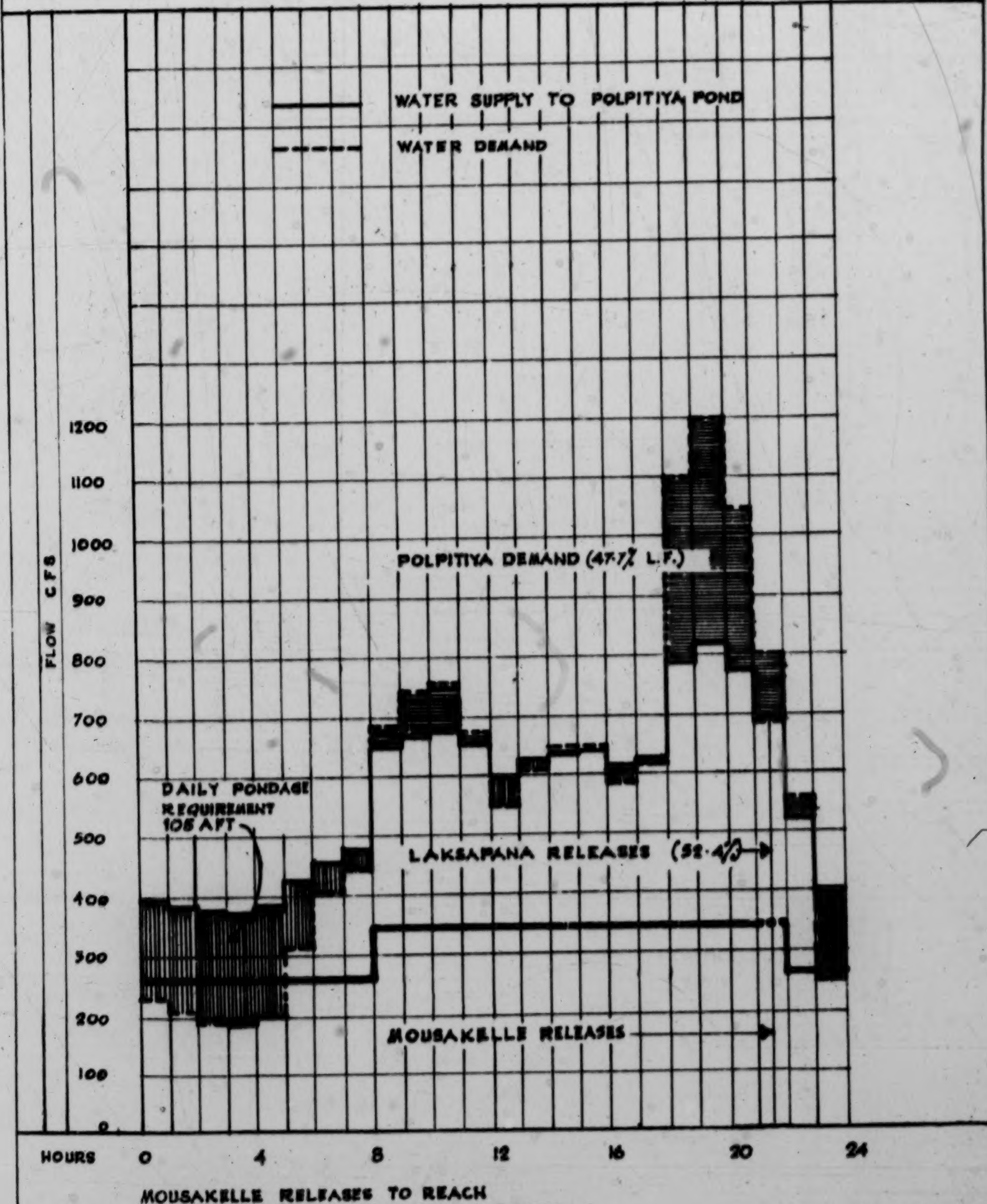
MASKELIYA OYA PROJECT
PROJECT AREA PLAN

FIG 2

Printed by Survey Dept., Ceylon, Oct. 1968.

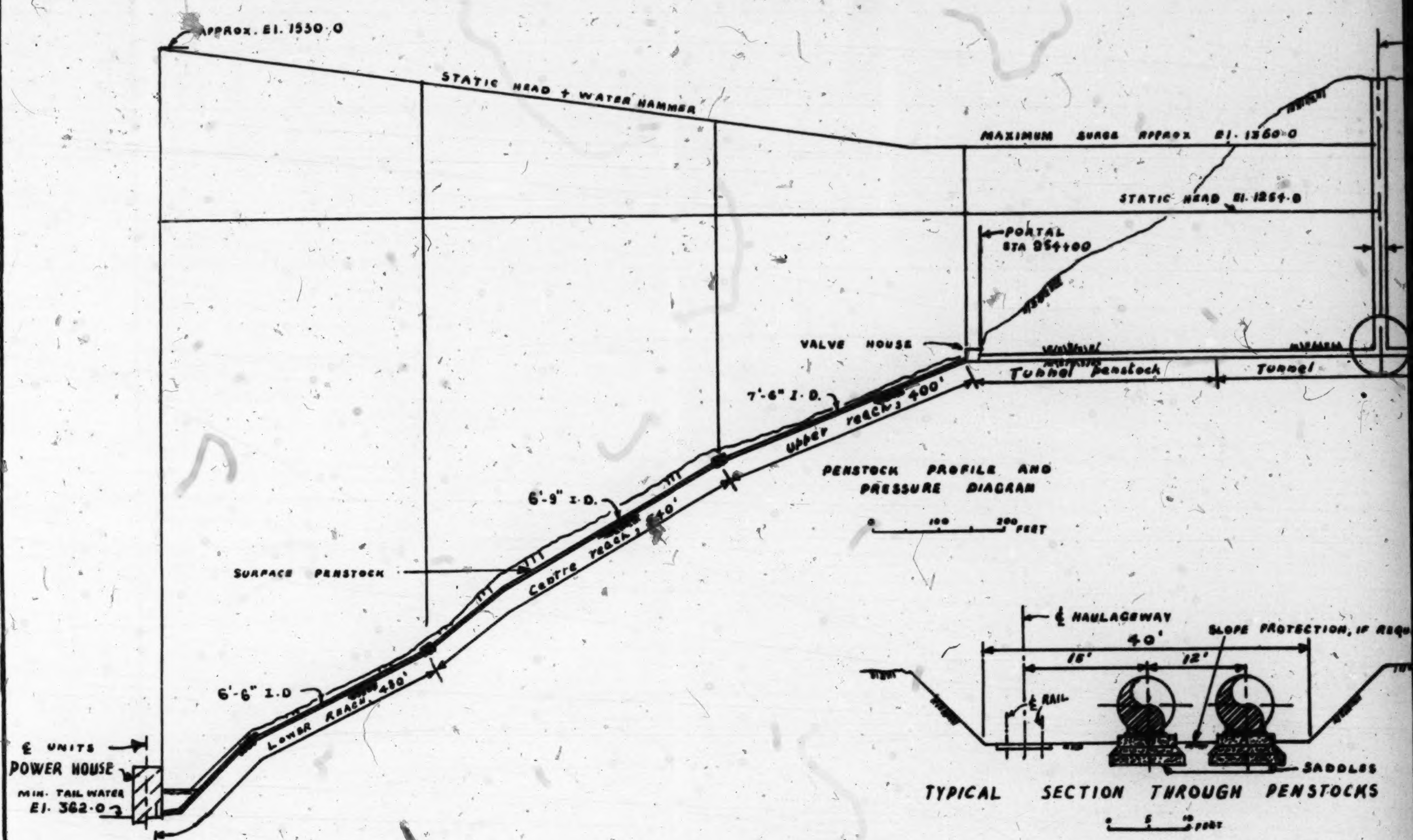
FIG. 3

POLPITIYA PLANT
MEAN HOURLY WATER SUPPLY
AND DEMAND



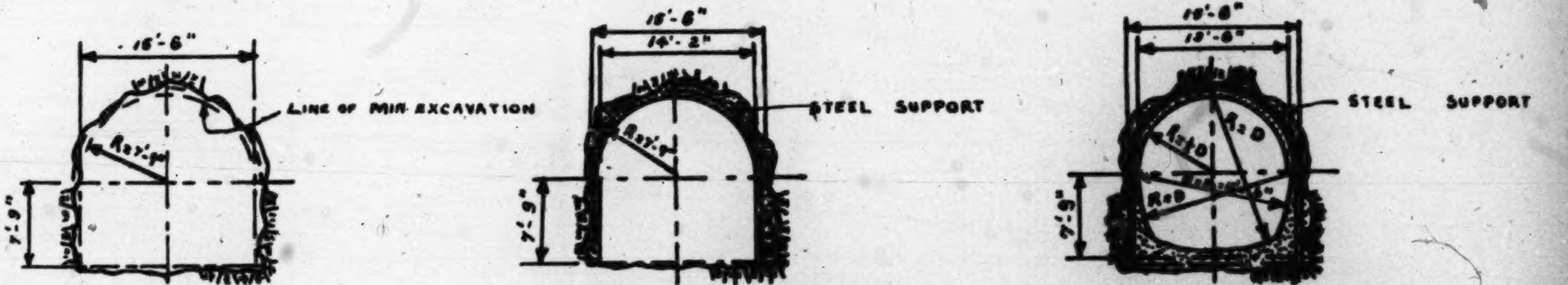
MOUSAKELLE RELEASES TO REACH
POLPITIYA POND AT THE TIME INDICATED

Printed by Survey Dept., Ceylon. Oct. 1955


APPROX. El. 1550.0
STATIC HEAD + WATER HAMMER
MAXIMUM SURGE APPROX El. 1360.0
STATIC HEAD El. 1254.0
PORTAL STA 954+00
VALVE HOUSE
Tunnel Penstock
Tunnel
7'-6" I.D.
Upper reach, 400'
6'-9" I.D.
Centre reach, 540'
SURFACE PENSTOCK
6'-6" I.D
Lower Reach, 480'
℄ UNITS
POWER HOUSE
MIN. TAIL WATER El. 362.0
0 100 200 FEET
℄ HAULAGEWAY
SLOPE PROTECTION, IF REQU
40'
15'
12'
℄ RAIL
SADDLES
0 5 10 FEET

PENSTOCK PROFILE AND PRESSURE DIAGRAM

TYPICAL SECTION THROUGH PENSTOCKS

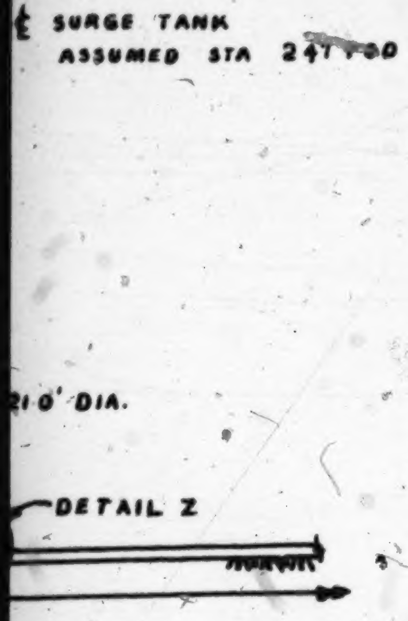

15'-6"
LINE OF MIN. EXCAVATION
R=7'-9"
7'-9"
15'-6"
14'-2"
STEEL SUPPORT
R=7'-9"
7'-9"
15'-6"
13'-6"
STEEL SUPPORT
R=D
R=D
R=D
7'-9"

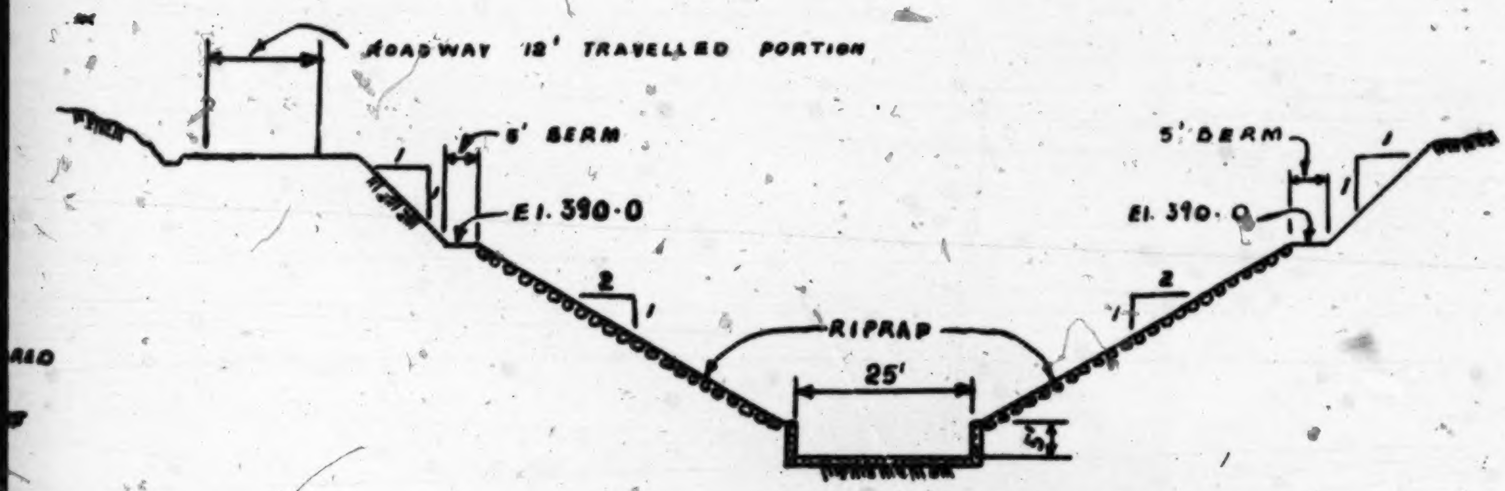
UNLINED

LIGHT CONCRETE LINING
WITH & WITHOUT STEEL SUPPORTS

HEAVY CONCRETE LINING
WITH STEEL SUPPORTS

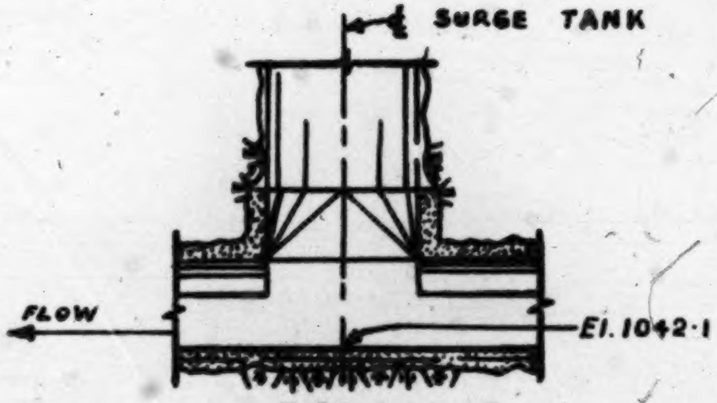
TYPICAL SECTIONS THROUGH POWER TUNNEL


℄ SURGE TANK
ASSUMED STA 24+00
21.0' DIA.
DETAIL Z


ROADWAY 12' TRAVELLED PORTION
5' BERM
1
El. 390·0
2
1
RIPRAP
25'
2
1
5' BERM
1
El. 390·0
RED

TYPICAL SECTION THROUGH TAILRACE

0 10 20 Feet


℄ SURGE TANK
FLOW
El. 1042·1

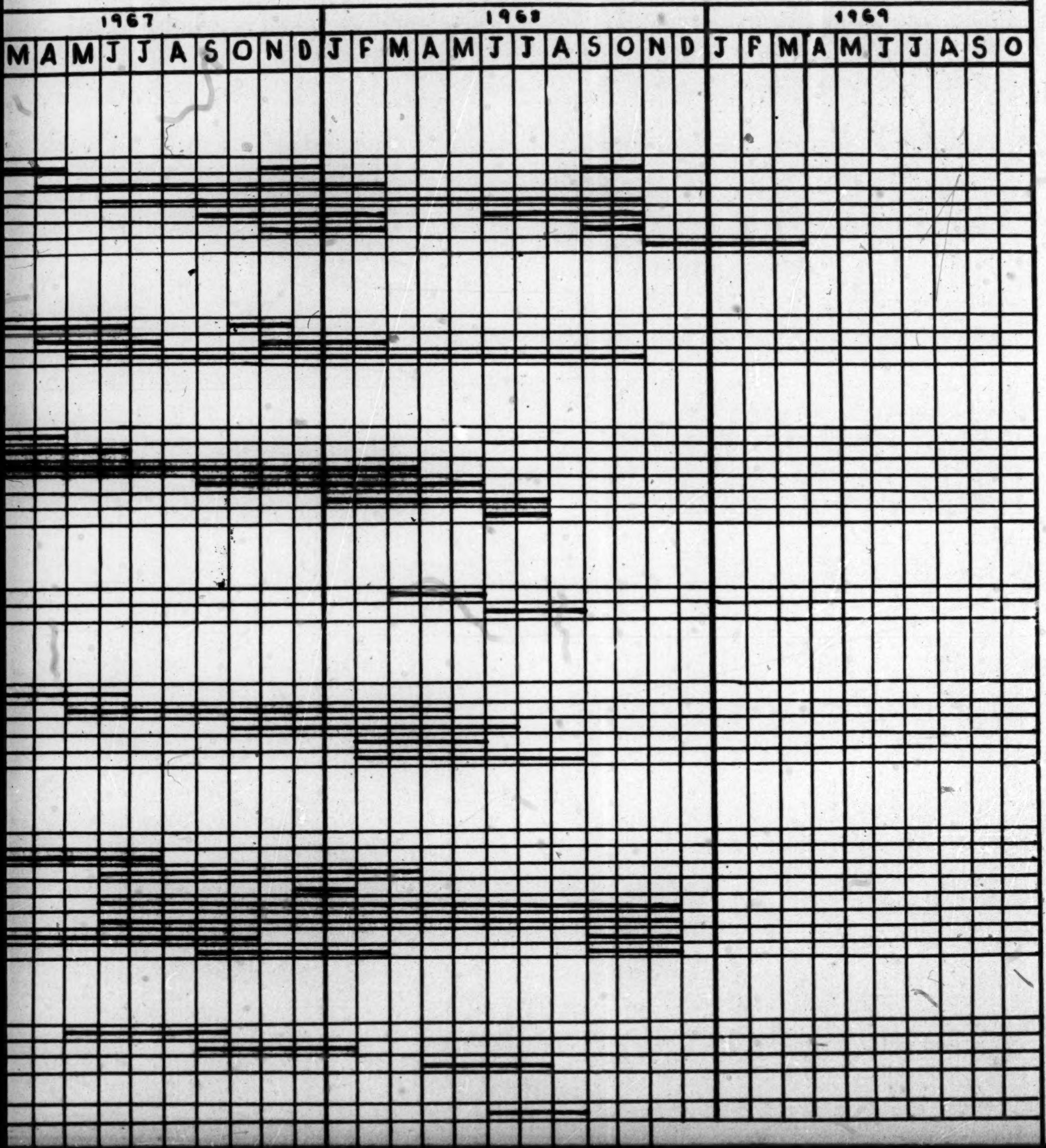
DETAIL Z

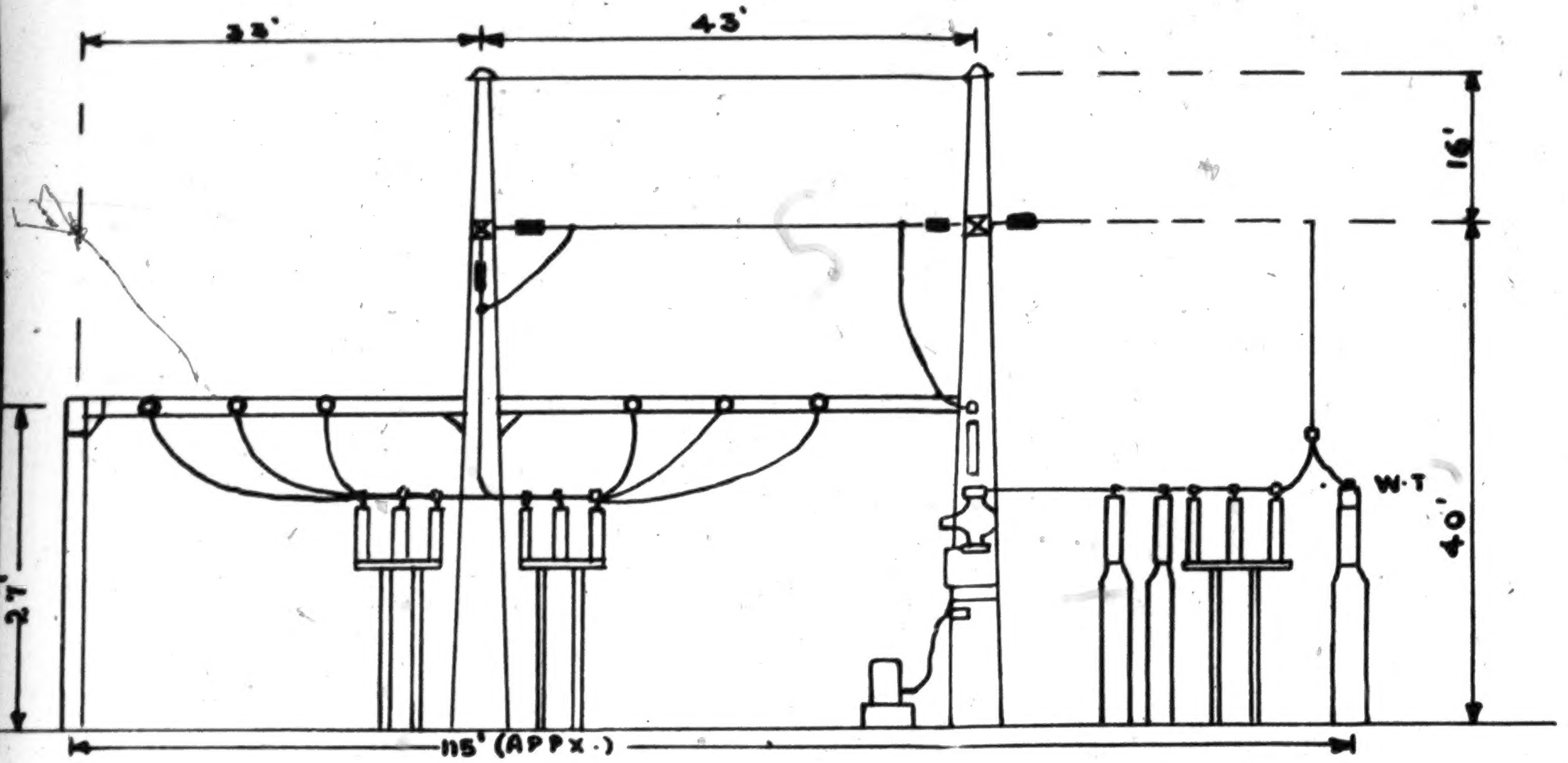
CONSTRUCTION

	1965		1966													
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
MOUSAKELLE DAM																
DIVERSION WORKS																
EXCAVATION AND FOUNDATION PREPARATION																
DAM CONSTRUCTION																
EARTH ABUTMENTS																
DYKES																
RESERVOIR FILLING																
POLPITIYA DAM																
DIVERSION WORKS																
EXCAVATION																
DAM CONSTRUCTION																
POWER TUNNEL																
ACCESS ROADS																
INTAKE AND ADITS EXCAVATION																
TUNNEL EXCAVATION																
LINING																
INTAKE CONSTRUCTION																
ADIT SEALING AND CLEAN-UP																
SURGE SHAFT																
EXCAVATION																
LINING																
PENSTOCKS																
ACCESS AND EXCAVATION																
FOOTINGS																
STEEL INSTALLATION																
ANCHOR BLOCKS																
PENSTOCK VALVEHOUSE																
POWERHOUSE																
ACCESS ROADS		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬			
EXCAVATION																
SUB STRUCTURE																
SUPER STRUCTURE																
MECHANICAL EQUIPMENT INSTALLATION AND TESTING																
ELECTRICAL EQUIPMENT INSTALLATION AND TESTING																
TAILRACE																
RIVER CHANNEL IMPROVEMENT																
SWITCHYARD																
EXCAVATION AND GRADING																
FOOTINGS AND TOWERS																
ELECTRICAL EQUIPMENT INSTALLATION																
TRANSMISSION LINE																

SCHEDULE

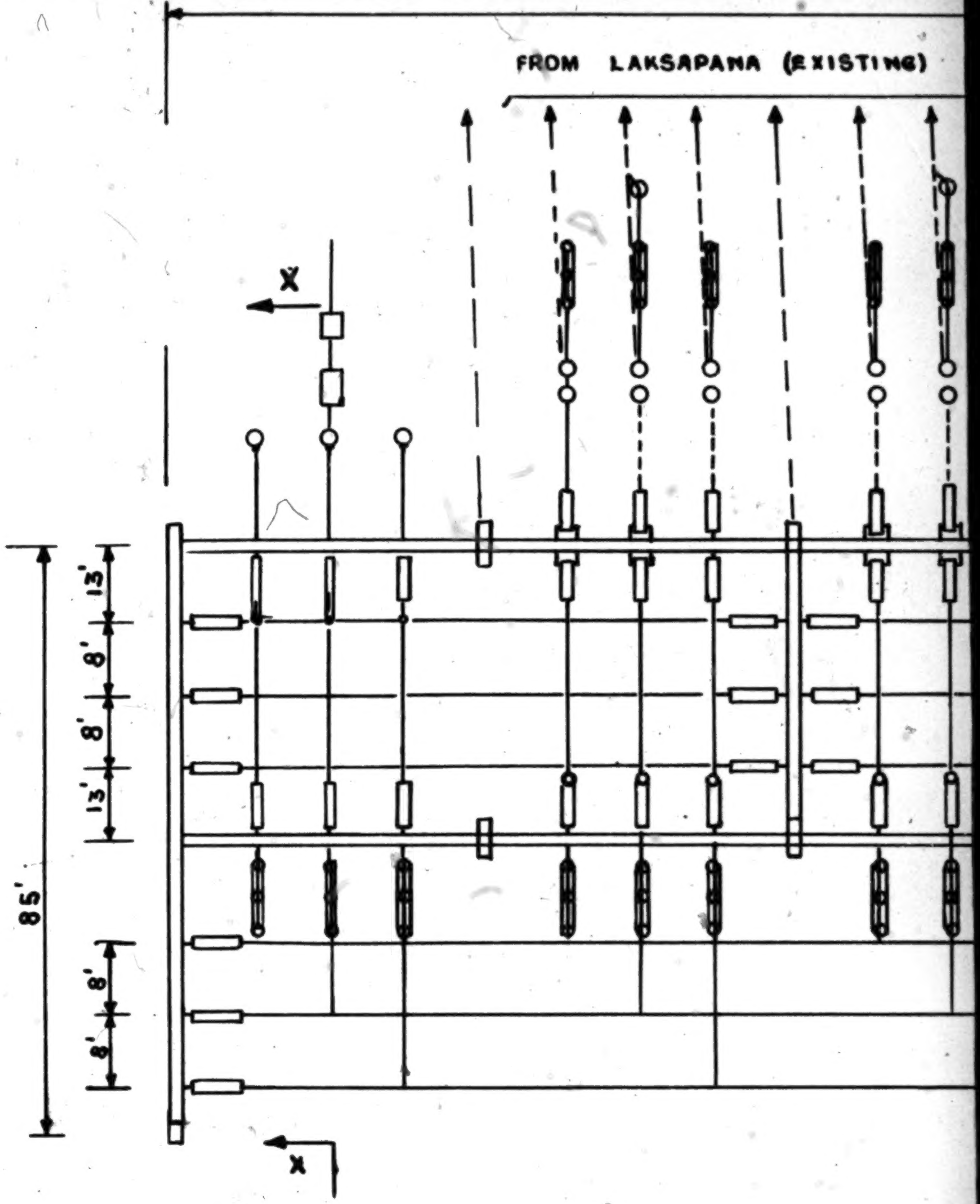
FIG 6

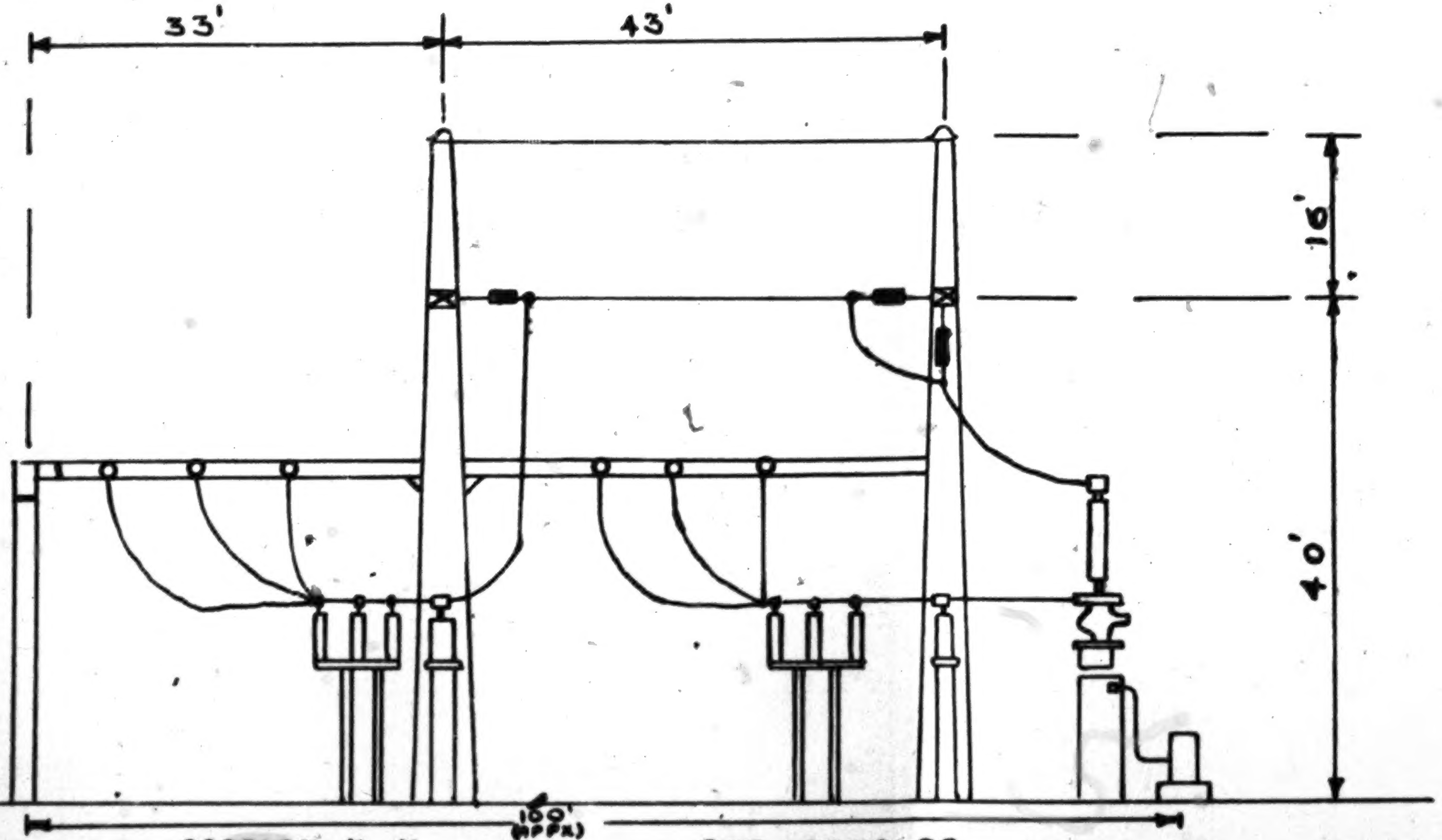



33'
43'
16'
40'
27'
W.T
115' (APPX.)

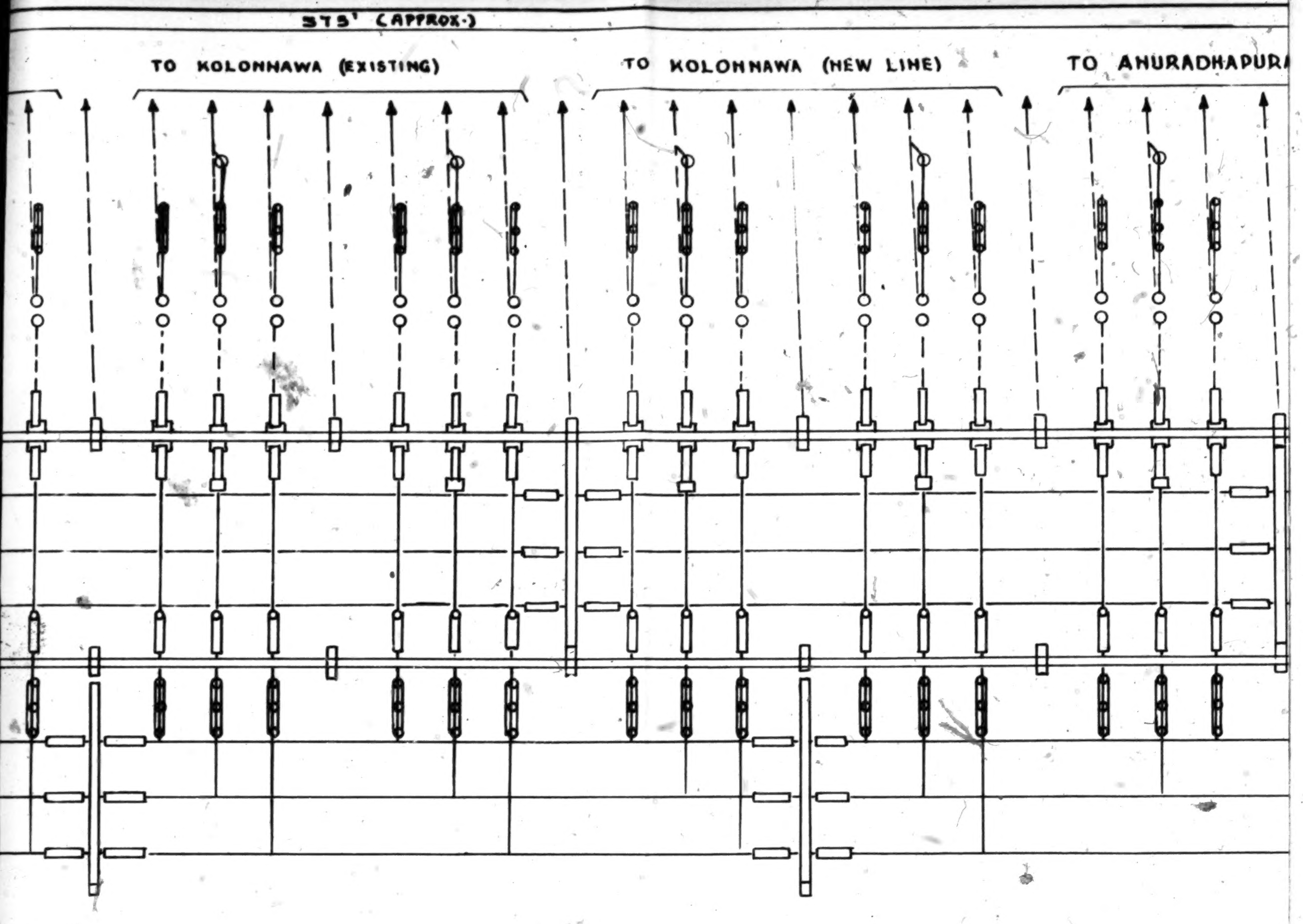
SECTION Y - Y

132 K.V LINE FEEDER BAY

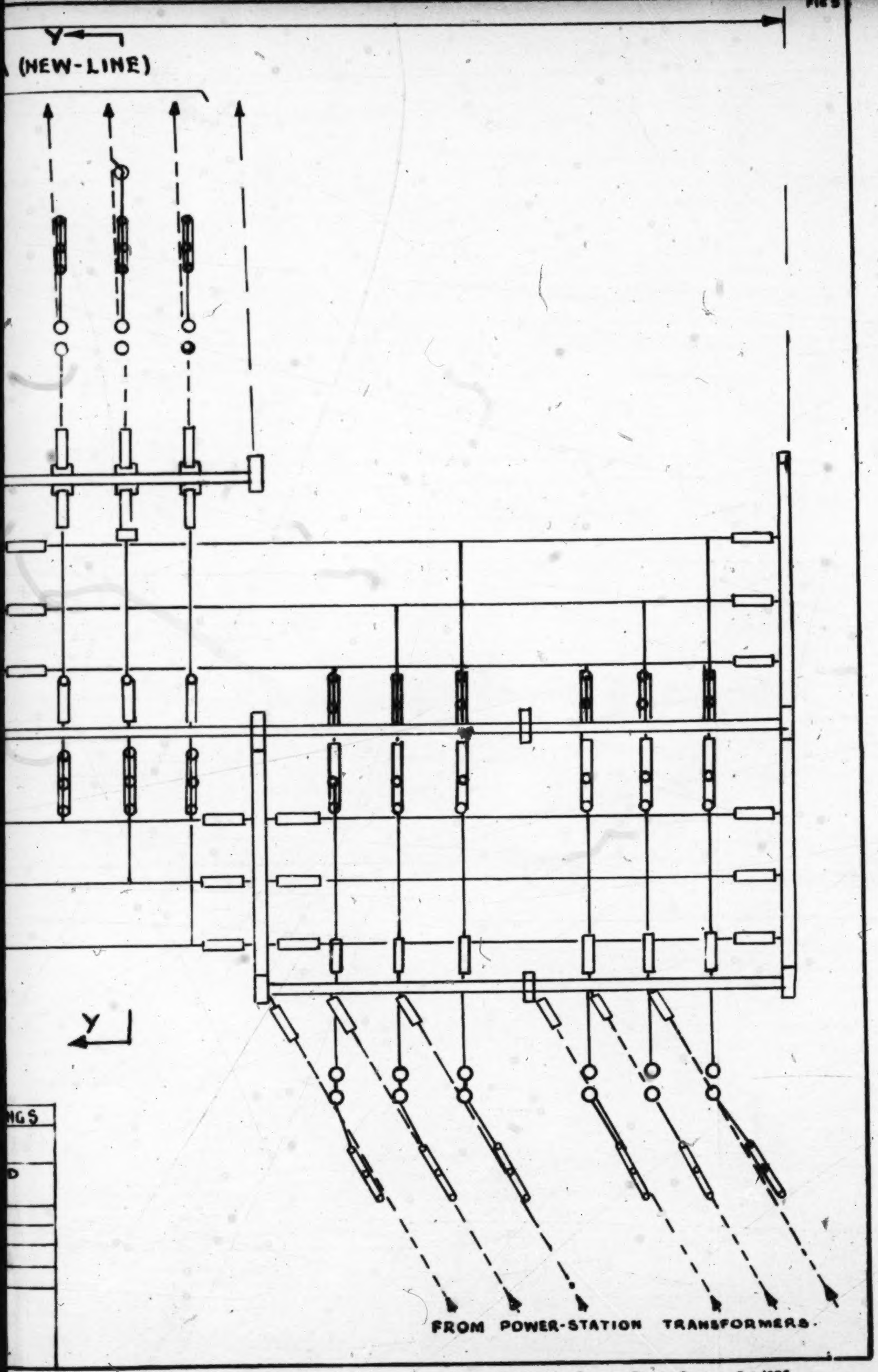

FROM LAKSAPANA (EXISTING)
X
13'
8'
8'
13'
85'
8'
8'
X


33'
43'
16'
40'
100' (APPX)

SECTION X - X BUS COUPLER


575' (APPROX.)
TO KOLONNAWA (EXISTING)
TO KOLONNAWA (NEW LINE)
TO ANURADHAPURA

DEPT. OF GOVT ELECTRICAL UNDERTAKI	
MASKELIYA-OYA PROJECT STAGE I	
TITLE OF DRAWING	PROPOSED 132 KV SWITCHYAR LAY-OUT AT POLPITIYA
DRAWN BY:	DATE :-
TRACED BY: H. Jittana	SCALE:
CHECKED BY:	DRG. Nº:
D.O.A.	DRAWER Nº:-
DEVALOPMENT AND PLANING ENGINEER	


Y←
(NEW-LINE)
Y
NGS
D
FROM POWER-STATION TRANSFORMERS.

Printed by Survey Dept., Ceylon Oct. 1966

Contract No. 5.—(Polpitiya Tunnel and Surge Shaft)—consists of the construction of the Polpitiya Tunnel approximately 14 feet in diameter and 25,400 feet in length and the 21 feet diameter surge shaft.

This contract too has been awarded to Messrs Ingra of Yugoslavia at a total cost of Rs. 31·5 millions of which Rs. 19·3 millions will form the foreign cost.

Associated with Messrs Ingra in the construction of the work covered by Contracts Nos. 1 and 5 is a Ceylonese firm Messrs Ceylon Development Engineering Co. Ltd., who will undertake the construction of the Mousakelle Dam.

In addition to the work referred to above the Maskeliya Town and the Kintyre Bazaar will be relocated in a planned modern township. New roads which will be above the maximum level of the reservoir will be constructed.

The total estimated of the cost of the project is Rs. 181,937,307 of which Rs. 89,530,277 represent the foreign cost whilst the local cost is Rs. 92,407,030.

As mentioned earlier part of the foreign cost, to the extent of Rs. 42,063,093 millions will be met from Canadian funds made available to the Government of Ceylon by the Canadian Government through the Export Credit Insurance Corporation of Canada. Expenditure to be met from this loan is restricted to Canadian services and Equipment with at least 90% Canadian content. This is a 12 year loan carrying an interest rate of 6%. The first annuity falls due on 1.2.66 and by 1.2.78 the loan and interest thereon would be repaid in full.

Part of the foreign cost (limited to contract Nos. 1 and 5) amounting to Rs. 19,393,124 millions will be met from a 8 year loan made available from the Yugoslav Bank for Foreign Trade at an interest rate of 3·2%. This loan too is restricted to meet payments in respect of Yugoslav services and materials. The first annuity falls due on 22.5.1969. The capital and interest thereon will be paid in full by 22.11.73.

This balance amount of Rs. 29,074,060 millions of foreign expenditure will be met from Ceylon Government funds.

The phasing of annual expenditure, including interest during construction is as follows :—

	Foreign *Rs. millions*	*Local* *Rs. millions*	*Total* *Rs. millions*
1965/66	18,287	2,200	20,487
1966/67	18,525	48,700	67,225
1967/68	18,000	28,460	46,460
1968/69	34,718	13,047	47,765

The entire project will be completed and commissioned in November, 1968. The construction schedule is shown in Fig. 6.

Transmission

TRANSMISSION NETWORK AND SYSTEM DEVELOPMENT

The modern Transmission network for a projected power system is effectively planned by studies on a Network Analyser. The first network analyser study for the Island's protected primary transmission Grid was conducted in 1953 on an AC inpedance Type Analyser of the Associated Electrical Industries Ltd., in U. K. The purpose of the study was to determine the probable methods of expansion of the Islands' Transmission network and to select the proper voltage and the size of conductors ensuring the minimum amount of redundancy in lines and equipment. For this study a load growth of 10% per annum was assumed and the load for a period of 30 years was assessed at 670 MW for loading conditions in 1981. The power requirements for Colombo were assessed at 370 MW, the balance 300 MW being distributed requirements for the rest of the Island. Two alternative transmission voltages of 220 kv and 132 kV with ·125 and ·175 sq. in. (Cu Equivalent) SCA conductors were used for the study. A transmission voltage of 132 kV with 0.175 sq. in (Cu Equivalent) SCA. Conductors proved to be preferable on economic grounds.

The Second study on the network Analyser was made through the joint efforts of the D. G. E. U. and the United States Aid Mission to Ceylon in October, 1961. The Analyser facilities were provided by Indian Institute of Science at Bangalore, S. India. The purpose of this study was to determine the basic transmission System Characteristics which would satisfy load and generation conditions brought about by information then available on specific industrial loads plus normal load growth up to the year 1978 and proposed additions in generating plant under consideration for Maskeliya Oya, Samanalawewa and Mahaweli Ganga projects. Load Power forecasts prepared by the Commercial section of the D. G. E. U. were used as the basis for the various loading conditions. The total load requirements for 1978 heavy P.M. loading were assessed at 330·9 MW and 160.1 M. V. A. R. S. and the total generation to meet these loads were found to be 359 MW and 195·3 M. V. A. R. S. A three phase fault study for loading and generating conditions in 1978 was also conducted.

The third network Analyser Study of the Departments Transmission System was conducted in 1963 by the Consulting Engineers, Messrs Ingledow, Kidd & Associates Ltd., in Canada. The object of the study was :—

(1) To establish the transmission changes or additions required to incorporate the addition of the Polpitiya Hydro plant into the System.

(2) To assess the Overall System Characteristics in order to establish other changes or improvements required to improve System reliability and flexibility.

(3) To study proposed future extensions in corporating alternative generation programmes to meet projected load growth.

(4) To supplement and to bring up to date previous Analyser Studies conducted by the D. G. E. U. in 1961.

The Analyser Study was confined to peak and light load flows for three separate stages of proposed system development. Briefly the 1969 stage represents the system as planned on completion of the Polpitiya project, the 1975 stage considers the additional transmission to incorporate either New Laksapana, Theberton, Samanalawewa generating facilities or the Nugawela and Ukuwela generating facilities of the Mahaweli project. The 1980 stage represents the system incorporating the generation of both alternatives to meet the load growth up to 1980. The total load requirements for 1980 heavy P.M. loading were assessed at 460 MW and 178 M. V. A. R. S. The transient stability study conducted for the 1969 system indicates stable operation of the System during an aperodic disturbance.

Based on the analyser studies and other supplementary computations the 132 kV has been chosen and retained as the basic transmission voltage and the conductor size of 0.175 sq. in (Cu. Eq.) S. C. A. "Lynx" has been considered adequate to meet the system loading requirements up to 1980.

The plan has been developed from a study of a number of alternatives at each stage of development and is believed to represent the most economic expansion of the system based on present expectations.

Development to 1969

This stage of development represents the additions proposed up to the time that the additional power provided by the Polpitiya power plant. The transmission and distribution facilities required for this stage of development have been studied by the Planning and Development Division of the D. G. E. U. Specifications have been drawn up and tenders have been invited for the following facilities :—

A. Transmission and Distribution Facilities under Maskeliya Oya Project Stage I—132 kV Double Circuit Transmission Lines

The Transmission lines are to be supported on lattice steel towers carrying duplicate circuits on each side with two earth wires fixed to the top of the towers.

The conductors are to be of 0.175 sq. in (Copper Equivalent) S. C. A. with 7/6 A. W. G. alumo weld Earth wire.

(1) About 45 miles of line from Polpitiya Switch yard to Kolonnawa Receiving Station.

(2) About 72 miles of line from Polpitiya Switch yard to Dambulla Sub-station.

(3) About 32 miles of lines from Dambulla Sub-station to Anuradhapura Switching Station.

(4) About 120 miles of line from Anuradhapura Switching Station through Vavuniya, Paranthan to Chunnakam Receiving Station.

(5) About 56 miles of line from the Switching Station Anuradhapura to Trincomalee Sub-station.

B. Switching Receiving Stations and Sub-stations to be provided under Maskeliya Oya Project Stage I

Section No. 1.—A 132 kV Switching Station with 2 × 10 MVA 132/33 kV step-down sub-station at Anuradhapura comprising 132 kV, 33 kV, LV switch gear, D. C. switchgear and equipment. 132/33 kV transformers neutral earthing transformers, Arc suppression coils, protective and control equipment, earthing system, fire fighting equipment, cables and accessories, carrier communication equipment, outdoor structures, foundations, control equipment, access roads, cable trenches and connected civil engineering works including clearing; filling, and levelling of sites.

Section No. 2.—An extension to the 132 kV Receiving Station at Kolonnawa by two bays comprising 132 kV switchgear protective and control equipment, earthing system cables and accessories, outdoor structures and foundations and associated civil engineering works including clearing, filling and levelling of sites.

Section No. 3.—A 132 kV Receiving Station with 2-3×10 MVA 132/33 kV Step-down sub-station at Chunnakam comprising the necessary equipment and works as generally described in Section No. 1.

Section No. 4.—A 132/33 kV. 2 × 5 MVA step-down sub-station at Deniyaya comprising the necessary items of equipment and works as generally described in Section I.

Section No. 5.—A 132/33 kV 2 × 5 MVA step-down sub-station at Dambulla.

Section No. 6.—A 132/33 kV 2 × 5 MVA step-down sub-station at Vavuniya.

Section No. 7.—A 132/33 kV 2 × 5 MVA step-down sub-station at Paranthan.

Section No. 8.—A 132/33 kV × 2 × 5 MVA step-down sub-station at Trincomalee.

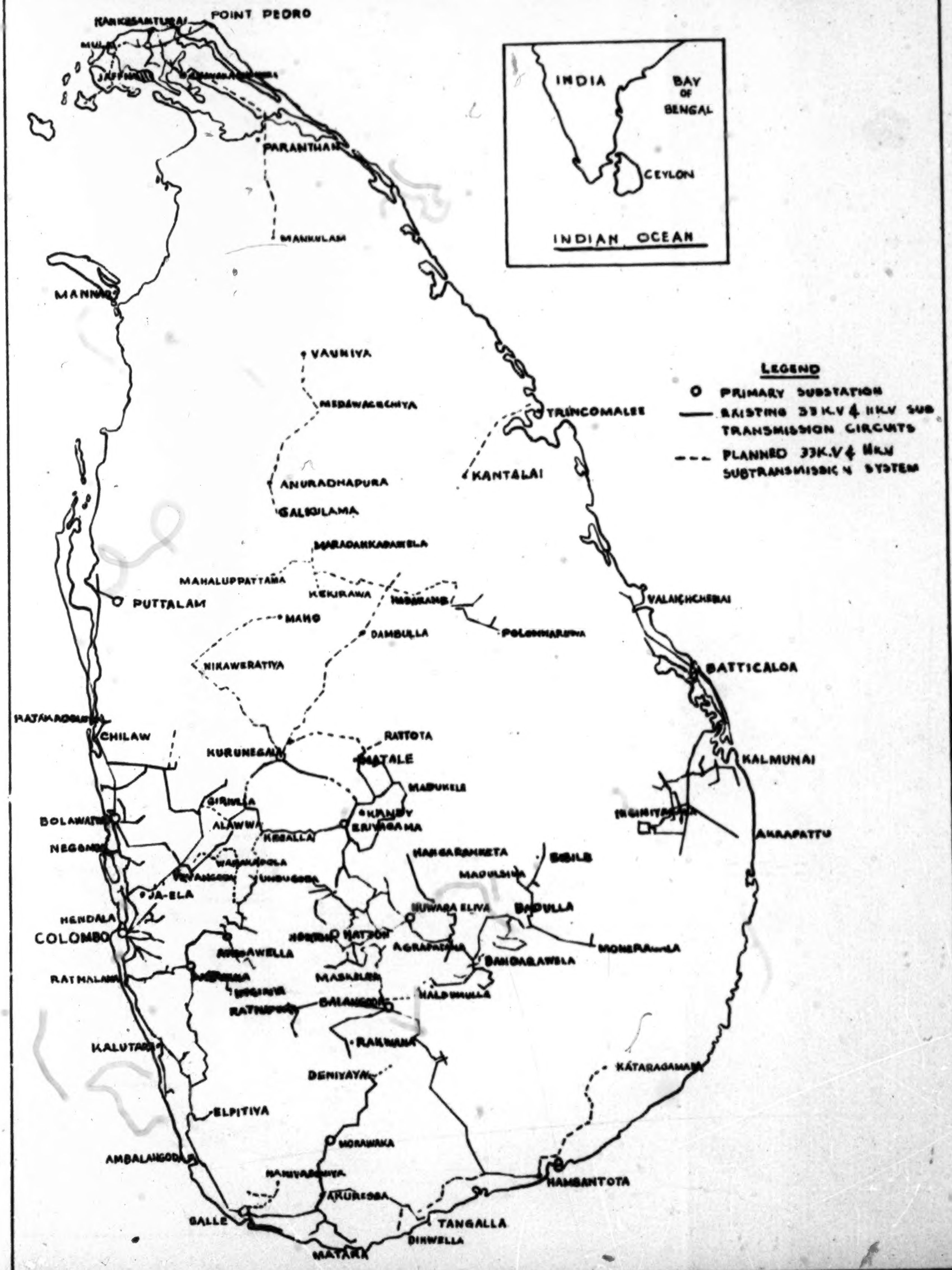
Section No. 9.—A 132/33 kV — 2 × 10 MVA step-down sub-station at Ragama.

Section No. 10.—Spares for equipment at all stations covered by sections 1 to 9.

Section No. 11.—Civil engineering works connected with quarters, office buildings, stores, garages, etc., at specified site.

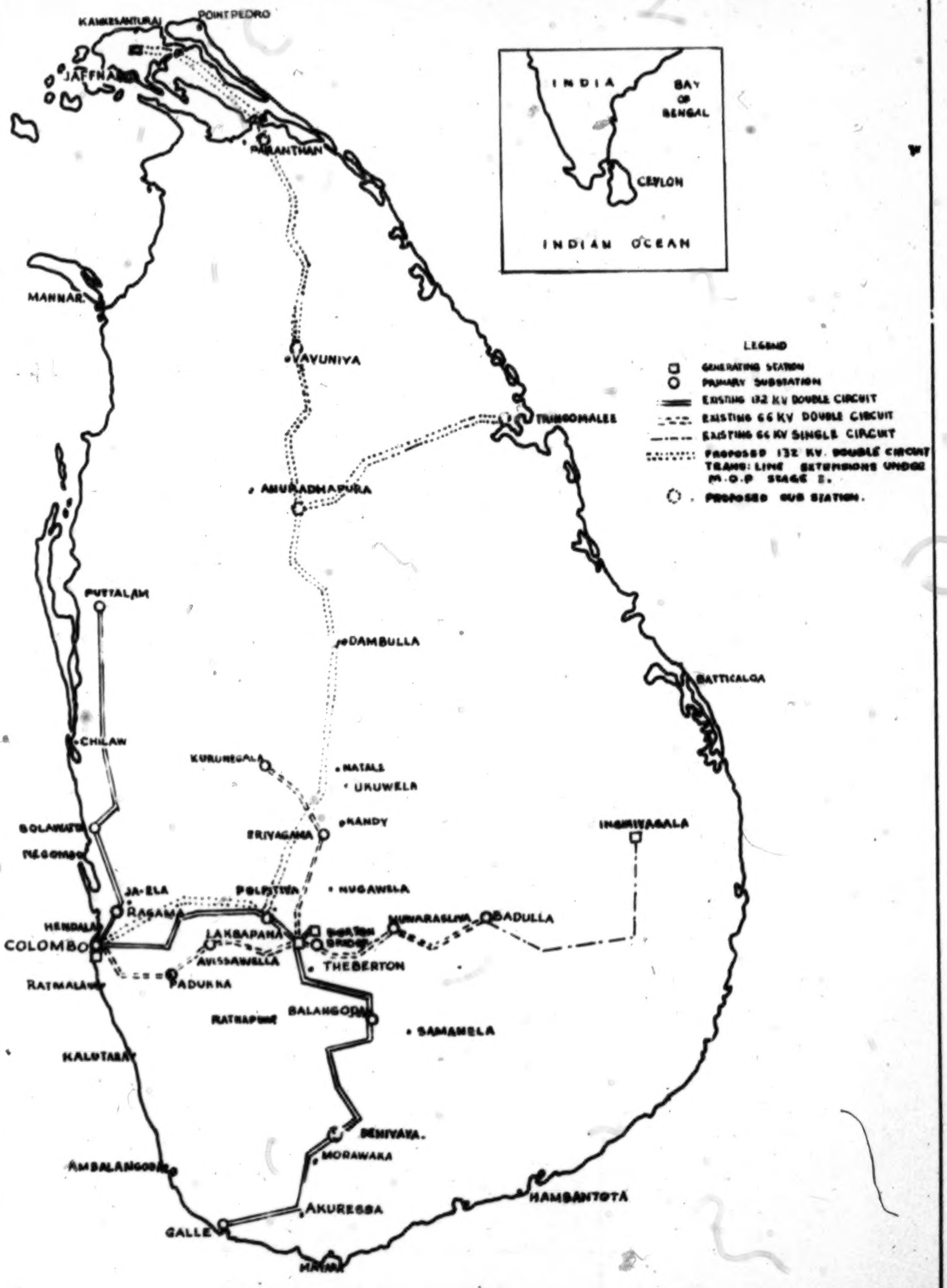
The existing D. G. U. E. 132 kV system and proposed additions are shown in Exhibits No. 1 and No. 2.

SUBTRANSMISSION SYSTEM - EXISTING & PLANNED

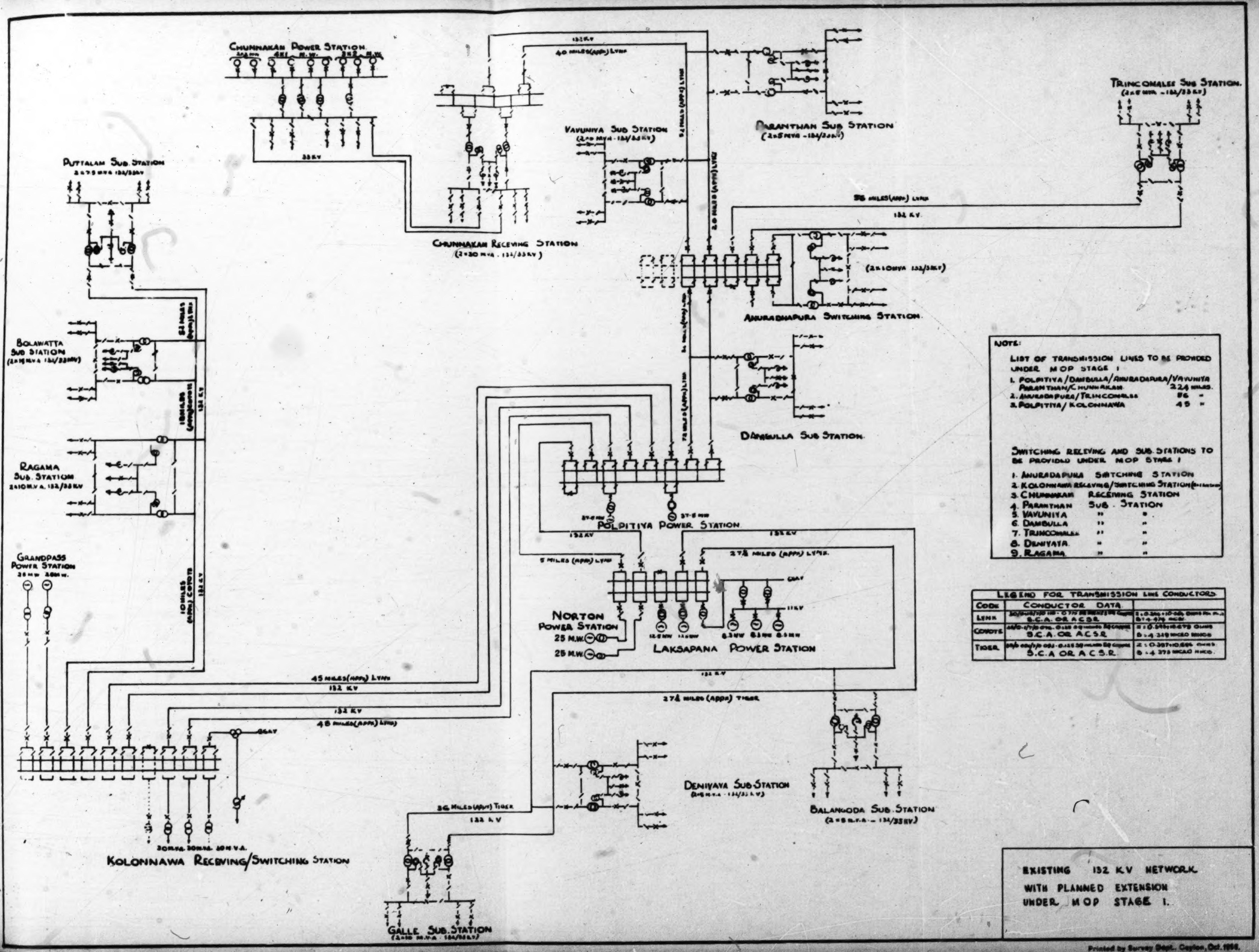

KANKESANTURAI
POINT PEDRO
JAFFNA
PARANTHAN
MANKULAM
MANNAR
VAUNIYA
MEDAWACHCHIYA
ANURADHAPURA
GALKULAMA
MARADANKADAWELA
MAHALUPPATTAMA
KEKIRAWA
HABARANE
POLONNARUWA
MAHO
DAMBULLA
NIKAWERATIYA
PUTTALAM
TRINCOMALEE
KANTALAI
VALAICHCHENAI
BATTICALOA
KALMUNAI
INGINIYAGALA
AKKARAPATTU
CHILAW
KURUNEGALA
RATTOTA
MATALE
MADUKELE
GIRIULLA
BOLAWATTA
ALAWWA
KANDY
KEGALLA
NEGOMBO
WARAKAPOLA
VEYANGODA
UNDUGODA
JA-ELA
HANGURANKETA
BIBILE
MADULSIMA
NUWARA ELIYA
BADULLA
HENDALA
COLOMBO
HATTON
AGRAPATANA
MONERAGALA
BANDARAWELA
RATMALANA
MASKELIYA
HALDUMMULLA
RATNAPURA
BALANGODA
KALUTARA
RAKWANA
DENIYAYA
KATARAGAMA
ELPITIYA
MORAWAKA
AMBALANGODA
HAMBANTOTA
AKURESSA
GALLE
TANGALLA
DIKWELLA
MATARA
INDIA
BAY OF BENGAL
CEYLON
INDIAN OCEAN
LEGEND
○ PRIMARY SUBSTATION
— EXISTING 33 K.V & 11 K.V SUB TRANSMISSION CIRCUITS
- - - PLANNED 33 K.V & 11 K.V SUBTRANSMISSION SYSTEM

Printed by Survey Dept., Ceylon. Oct. [illegible]

TRANSMISSION SYSTEM WITH PLANNED 132 K.V EXTENSIONS UNDER M.O.P STAGE 1


KANKESANTURAI
POINT PEDRO
JAFFNA
PARANTHAN
INDIA
BAY OF BENGAL
CEYLON
INDIAN OCEAN
MANNAR
VAVUNIYA
LEGEND
GENERATING STATION
PRIMARY SUBSTATION
EXISTING 132 KV DOUBLE CIRCUIT
EXISTING 66 KV DOUBLE CIRCUIT
EXISTING 66 KV SINGLE CIRCUIT
PROPOSED 132 KV. DOUBLE CIRCUIT TRANS: LINE EXTENSIONS UNDER M.O.P STAGE I.
PROPOSED SUB STATION.
TRINCOMALEE
ANURADHAPURA
PUTTALAM
DAMBULLA
BATTICALOA
CHILAW
KURUNEGALA
NATALE
UKUWELA
KANDY
BOLAWATTE
ERIYAGAMA
INGINIYAGALA
NEGOMBO
JA-ELA
POLPITIYA
NUGAWELA
RAGAMA
HENDALA
NUWARAELIYA
BADULLA
COLOMBO
LAKSAPANA
NORTON BRIDGE
AVISSAWELLA
THEBERTON
RATMALANA
PADUKKA
RATNAPURA
BALANGODA
SAMANELA
KALUTARA
DENIYAYA
MORAWAKA
AMBALANGODA
HAMBANTOTA
AKURESSA
GALLE
MATARA

Printed by Survey Dept., Ceylon. Oct. 1966


CHUNNAKAM POWER STATION
2x2 MW
4x1 M.W.
3x2 M.W.
33 KV
CHUNNAKAM RECEVING STATION
(2×30 MVA. 132/33 KV)
132 KV
40 MILES (APP.) LYNX
PARANTHAN SUB STATION
(2×5 MVA - 132/33 KV)
VAVUNIYA SUB STATION
(2×10 MVA - 132/33 KV)
TRINCOMALEE SUB STATION.
(2×5 MVA - 132/33 KV)
56 MILES (APP.) LYNX
132 KV.
PUTTALAM SUB. STATION
2×7.5 MVA 132/33 KV
52 MILES (APP.) LYNX
(2×10 MVA 132/33 KV)
ANURADHAPURA SWITCHING STATION.
BOLAWATTA SUB STATION
(2×15 MVA 132/33 KV)
18 MILES (APP.) COYOTE
132 KV
DAMBULLA SUB STATION.
72 MILES (APP.) LYNX
RAGAMA SUB. STATION
2×10 M.V.A. 132/33 KV
37.5 MW
37.5 MW
POLPITIYA POWER STATION
132 KV
132 KV
5 MILES (APP.) LYNX
27½ MILES (APP.) LYNX
GRANDPASS POWER STATION
25 MW 25 MW
10 MILES (APP.) COYOTE
132 KV
33 KV
11 KV
NORTON POWER STATION
25 M.W.
25 M.W.
12.5 MW
12.5 MW
8.3 MW 8.3 MW 8.3 MW
LAKSAPANA POWER STATION
45 MILES (APP.) LYNX
132 KV
132 KV
27½ MILES (APP.) TIGER
132 KV
48 MILES (APP.) LYNX
33 KV
DENIYAYA SUB-STATION
(2×5 M.V.A. - 132/33 K.V.)
BALANGODA SUB. STATION
(2×5 M.V.A. - 132/33 KV.)
36 MILES (APP.) TIGER
132 KV
30 M.V.A. 30 M.V.A. 30 M.V.A.
KOLONNAWA RECEVING/SWITCHING STATION
GALLE SUB. STATION
(2×10 M.V.A. 132/33 KV)

NOTE:

LIST OF TRANSMISSION LINES TO BE PROVIDED UNDER MOP STAGE I

1. POLPITIYA/DAMBULLA/ANURADAPURA/VAVUNIYA PARANTHAN/CHUNNAKAM 224 MILES.
2. ANURADAPURA/TRINCOMALEE 56 "
3. POLPITIYA/KOLONNAWA 45 "

SWITCHING RECEVING AND SUB. STATIONS TO BE PROVIDED UNDER MOP STAGE I

1. ANURADAPURA SWITCHING STATION
2. KOLONNAWA RECEVING/SWITCHING STATION (extension)
3. CHUNNAKAM RECEIVING STATION
4. PARANTHAN SUB. STATION
5. VAVUNIYA " "
6. DAMBULLA " "
7. TRINCOMALEE " "
8. DENIYAYA " "
9. RAGAMA " "

LEGEND FOR TRANSMISSION LINE CONDUCTORS		
CODE	CONDUCTOR DATA	
LYNX	[illegible] S.C.A. OR A.C.S.R.	Z: 0.280+10.661 OHMS [illegible] B: 4.474 MICRO [illegible]
COYOTE	[illegible] S.C.A. OR A.C.S.R.	Z: 0.340+10.678 OHMS B: 4.329 MICRO MHOS
TIGER	[illegible] S.C.A. OR A.C.S.R.	Z: 0.387+10.694 OHMS B: 4.273 MICRO MHOS.

EXISTING 132 K.V NETWORK
WITH PLANNED EXTENSION
UNDER MOP STAGE I.

Printed by Survey Dept., Ceylon, Oct. 1958.

C. 500 miles of 33 kV Sub-Transmission Lines. Single Circuit 3 phase with 7/.161 A. C. S. R., and 7/14 S. W. G. Galvanised Stranded Steel Earth Conductors to be constructed under Maskeliya Oya Project Stage I

	Miles	*Total Miles*
(1) Nittambuwa–Warakapola	10	
(2) Undugoda–Kegalle	8.6	
(3) Bogala–Galigamuwa	10.1	
(4) Watupitiwela–Ruwanwella	12.5	
		41.20
(5) Sihapitiya–Hemathagama	4	
(6) Hemathagama–Dippitiya	3	
(7) Kitulgala–Polpitiya	3.9	
(8) Deraniyagala–Maliboda	5.9	
(9) Barnagala–Dolosbage	1.8	
		18.60
(10) Kuliyapitiya–Hettipola	9.75	
(11) Kurunegala–Wariyapola	16.1	
(12) Wariyapola–Nikaweratiya	12.5	
(13) Nikaweratiya–Maho	10	
		48.35
(14) Kurunegala–Ibbagamuwa–Galewela	23.5	
(15) Galewela–Dambulla	10.3	
(16) Ibbagamuwa–Dodangaslanda–Rattota	16	
(17) Matale–Rattota	5.25	
		55.05
(18) Potuhera–Polgahawela	6.5	
(19) Alawwa–Giriulla	8.5	
(20) Weuda–Galagedera–Halloluwa	11.25	
(21) Ella–Balagalla ella	5	
		31.25
(22) Dambulla–Pelvehera	1.5	
(23) Pelvehera–Habarana	12	
(24) Habarana- Maradankadawela–Kekirawa	19.5	
(25) Maradankadawala–Mahailluppalama	8	
(26) Habarana–Minneriya	12	
		53.00
(27) Anuradhapura–Medawachchiya	18	
(28) Medawachchiya–Vavuniya	16	
		34.00
(29) Trincomalee–Kantalai	23.0	
(30) Paranthan–Mankulam	22.5	
(31) Paranthan–Pallai–Chavakachcheri	29.0	
		74.50
(32) Puttalam Cement Factory–Palavi	2.5	2.50
(33) Balangoda–Belihuloya	5.5	
(34) Belihuloya–Haldamulla	9	
(35) Deniyaya–Hayes	8	
(36) Anningkanda–Urubokka	3.5	
(37) Rakwana–Godakawela	3	
		29.00

	Miles	*Total Miles*
(38) Agalawatte–Pimbura	2.3	
(39) Dartonfield–Pelawatte	9.5	
(40) Pelawatte–Kurundugahahetekme	13.8	
(41) Beliatta–Dickwella	6.2	
		31.80
(42) Tangalle–Ranna	7.5	
(43) Ranna–Ambalantota	8	
(44) Hambantota–Tissamaharama	15.5	
(45) Tissamaharama–Kataragama	10	
		41.00
(46) Bataduwa–Jubilee Pine	3	
(47) Jubilee Pine–Nakiyadeniya	6.8	
(48) Jubilee Pine–Citrus	4	
		13.80
(49) Ragama–Refinery	5	
(50) Ragama–Fertilizer Factory	4	
		9.00
(51) Essential Deviations or new lines on actual survey	16.95	
		16.95
	Total	500.00

Power Line Carrier Equipment for Communication Control Metering and Protection

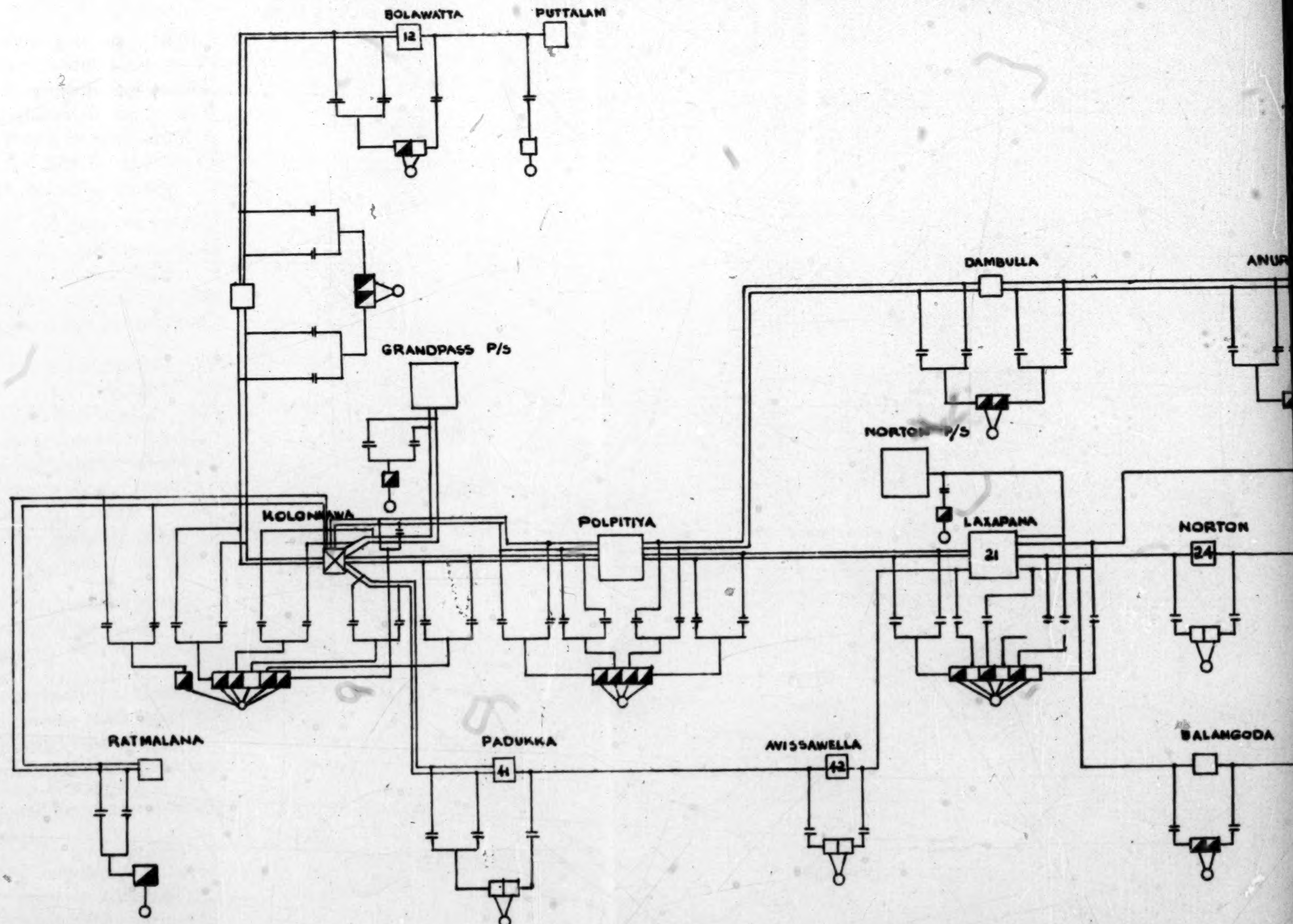
The Carrier Current Communication over the existing 132 kV and 66 kV power transmission lines is used for establishing telephonic communication between stations of the Power Supply Network. This type of communication is unaffected by atmospheric disturbances and has a transmission reliability as high as that of the power lines offering operational reliability without intermediate amplification for distances about 150 miles.

The existing system comprises a number of Power Line Carrier Links and Automatic exchanges (PAXX) arranged as shown in the drawing in the Appendix.

The carrier sets are of the fixed frequency, amplitude modulated type, for deplex communication. Both double side band and single side band units in use, and the carrier frequencies utilised are in the range 144 Kc/s to 300 Kc/s.

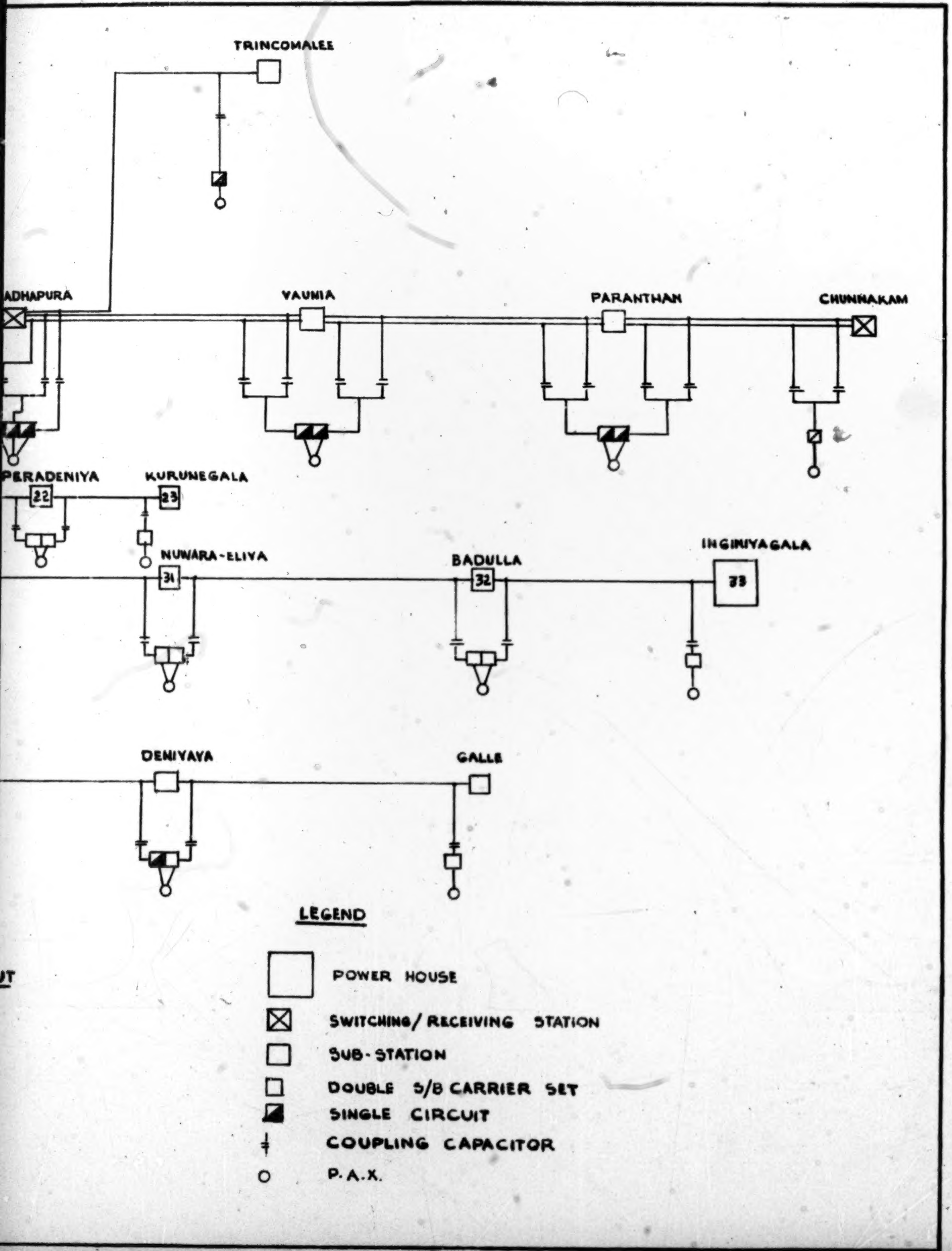
The sets are capacitor coupled to the Power Lines, and wave traps are inserted in the lines to confine the carrier signals to the sections of the carrier network, and are so located that earthing of the sub-station equipment or the power lines, or changes in the dispositions of the terminal equipment does not affect the performance of the carrier system.

The system provides fully automatic trunk line dialling between subscribers connected to any of the system PAXX. A group selector at each carrier set provides for flexbility, allows extension of the system and ensures that internal traffic on a local PAX is not affected by transit trunk conversations.


BOLAWATTA
12
PUTTALAM
GRANDPASS P/S
DAMBULLA
ANUR
NORTON P/S
KOLONNAWA
POLPITIYA
LAXAPANA
21
NORTON
24
RATMALANA
PADUKKA
41
AVISSAWELLA
42
BALANGODA

D.G.E.U CARRIER COMMUNICATIONS NET WORK LAYO

WITH MASKELIYA OYA EXTENSION SCHEME


TRINCOMALEE
ADHAPURA
VAUNIA
PARANTHAN
CHUNNAKAM
PERADENIYA
22
KURUNEGALA
23
NUWARA-ELIYA
31
BADULLA
32
INGINIYAGALA
33
DENIYAYA
GALLE
UT
LEGEND
POWER HOUSE
SWITCHING/ RECEIVING STATION
SUB-STATION
DOUBLE S/B CARRIER SET
SINGLE CIRCUIT
COUPLING CAPACITOR
P.A.X.

A subscriber gets up a trunk connection by first dialling a " directional " digit. This provides access to the group selector associated with the carrier set terminating the desired section of the power line carrier circuit, and engages the group selector of the set at the far end of that section. The directional digit is followed by the " trunk call " number (comprising two digits). This number is the same for any one station irrespective of the point in the network from which the call originates.

The trunk call numbers are evaluated and transferred through all the group selectors of the intermediate stations until it reaches the station corresponding to the number dialled. The subscriber is then connected to the PAX of that station, receives dial tone from the exchange, and can immediately dial the internal number required.

Should any of the sections of the overall carrier path be already in use, the caller receives an " engaged " signal and in general, must postpone his call. However, a limited number of subscribers are provided with a priority key. If such a subscriber received an " engaged " signal at any point in the dialling process he may connect himself across the engaged line by operating his priority key and request the speaking parties to hang up. When this has been done, the priority party's call is automatically put through without repetition of any dialling. The speaking parties are warned by an audible signal that a third party is seeking priority on their line.

Facility for blocking certain subscribers on the PAX from access to the carrier system is provided. They may, however, make internal calls on the local PAX.

The group selector equipment is provided with pulse repeaters which correct the pulses for any mark space distortion they may have suffered during transmission through the filters, and other circuitry of the carrier system, or through maladjustment of the initiating telephone dial.

The signalling characteristics of the existing automatic system are as follows :—

Signalling impulses are 50/50 milliseconds, i.e. 10 impulses per second. However, prior to transmission of impulses by the carrier equipment, the circuits are prepared by the transmission of coded engaging impulses 250/100/100 milliseconds. Also upon termination of the call, a release impulse of 800 milliseconds is transmitted. Priority signals are similarly preceded by the 250/100/00 code. This ensures that the automatic system does not respond to random noise or surges on the power line.

Colombo City Distribution System

The City of Colombo receives its supply at 33 kV from Kolonnawa Receiving Station. Power is distributed throughout the city and to consumers' premises over a network of 33 kV, 11 kV and 400/230 Volt under-ground cables.

The location of major facilities including sub-stations and the routings of the 33 kV and 11 kV circuits is shown on Exhibit No. 4. An Electrical Schematic diagram of the System is shown on Exhibit No. 5.

The system was first installed in the early 1930 as a single ring operating entirely at 11 kV. Subsequently three separate 11 kV rings were developed and 33 kV supply cables and sub-stations were added. The maximum demand served by the system in 1965 was 40 MVA.

In addition to the three 33/11 kV sub-station a fourth 33/11 kV sub-station with associated 33 kV and 11 kV cabling is being constructed. This sub-station will serve the fourth ring.

The estimated load growth rates reflect previous assumptions that the Colombo area load growth generally is expected to be higher than the average for the Island as a whole and that industrial growth is expected to be higher than either commercial or domestic growth.

Primary Supply

Three 132/30 MVA transformers are presently installed at Kolonnawa for the supply of Colombo City load. In addition, reserve transformer Capacity is provided by the 3 winding, 30 MVA inter-connecting transformer which can be disconnected from the 66 KV system and the entire output used for the 33 KV system Firm capacity is adequate to meet forecast system loads until 1975. Provision has been made to install a fourth 30 MVA transformer and space is available to install a fifth transformer. These arrangements will cover the requirements until 1980 or beyond.

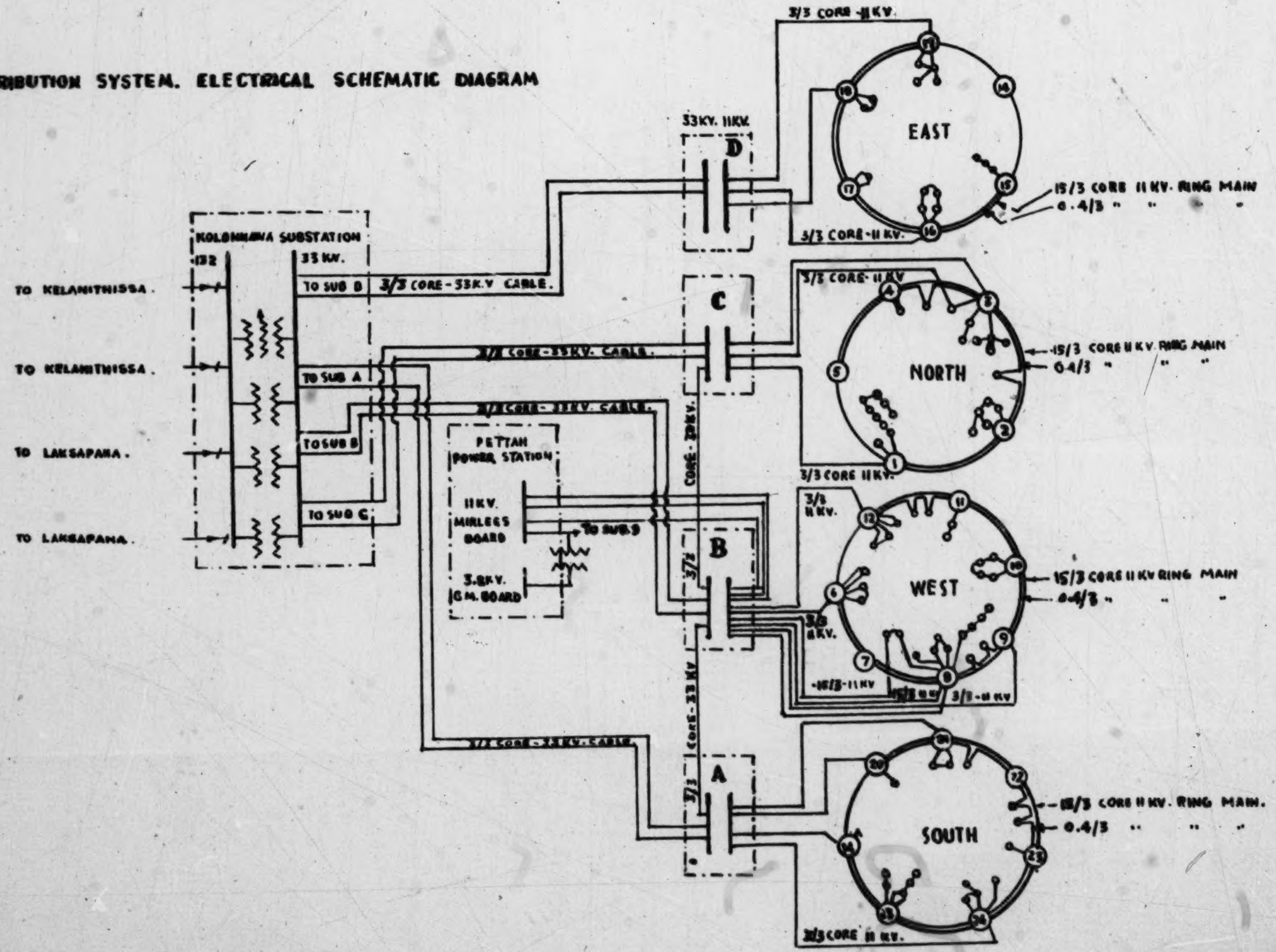
33kV Underground System

Each of the primary sub-stations, A, B, C, are supplied by two 33kV underground feeders from Kolonnawa as will sub-station 'D' when completed. Continuous current ratings for all 33 kV circuits are 330 Amperes giving a capacity of approximetely 19 MVA at 33 kV. The inter-sub-station looping circuits provide partial standby cable capacity in the event of failure of one of the main feeder circuits such that the firm supply to each sub-station is of the order of 30 MVA and to the system as a whole of the order of 120 MVA for sub-stations A, B, C, and D.

Primary Sub-stations

Present installed transformer capactiy at each sub-station is two 12.5 MVA on load regulating transformers. Transforemers and high voltage 33 kV switchgear are mounted outdoors. Low voltage switchgear is for the enclosed cubicle type and mounted indoors. A third 12.5 MVA transformer is being provided at both sub-stations A and B. Once these installations have been completed, sub-stations A and B will have a firm rated capacity of 25 MVA each.

COLOMBO DISTRIBUTION SYSTEM. ELECTRICAL SCHEMATIC DIAGRAM


TO KELANITHISSA.
TO KELANITHISSA.
TO LAKSAPANA.
TO LAKSAPANA.
KOLONNAWA SUBSTATION
132
33 KV.
TO SUB D
TO SUB A
TO SUB B
TO SUB C
3/3 CORE - 33 K.V CABLE.
3/3 CORE - 33 KV. CABLE.
3/3 CORE - 33 KV. CABLE.
3/3 CORE - 33 KV. CABLE
PETTAH POWER STATION
11 KV. MIRLEES BOARD
3.3 KV. G.M. BOARD
TO SUB.B
33 KV. 11 KV.
D
C
B
A
CORE - 33 KV.
3/3
CORE - 33 KV
3/3
EAST
NORTH
WEST
SOUTH
3/3 CORE - 11 KV.
3/3 CORE - 11 KV.
3/3 CORE - 11 KV.
3/3 CORE 11 KV.
3/3 11 KV.
3/3 11 KV.
15/3 - 11 KV
3/3 - 11 KV
3/3 CORE 11 KV.
15/3 CORE 11 KV. RING MAIN
0.4/3 " " "
15/3 CORE 11 KV. RING MAIN
0.4/3 " " "
15/3 CORE 11 KV RING MAIN
0.4/3 " " "
15/3 CORE 11 KV. RING MAIN.
0.4/3 " " "
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

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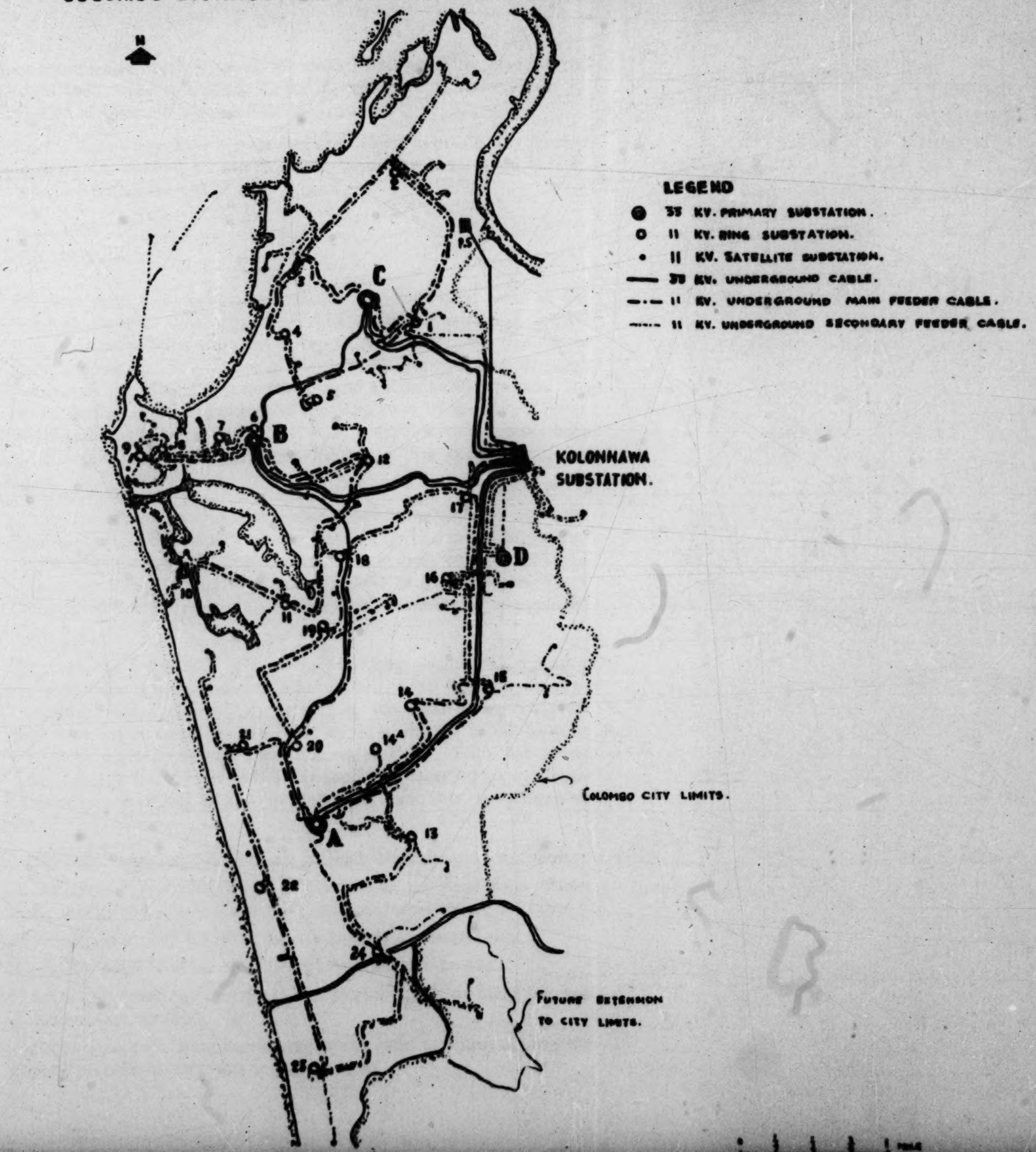
COLOMBO DISTRIBUTION SYSTEM LOCATION OF FACILITIES


N
LEGEND
◉ 33 KV. PRIMARY SUBSTATION.
○ 11 KV. RING SUBSTATION.
• 11 KV. SATELLITE SUBSTATION.
—— 33 KV. UNDERGROUND CABLE.
—·— 11 KV. UNDERGROUND MAIN FEEDER CABLE.
-·-·- 11 KV. UNDERGROUND SECONDARY FEEDER CABLE.
A
B
C
D
KOLONNAWA SUBSTATION.
COLOMBO CITY LIMITS.
FUTURE EXTENSION TO CITY LIMITS.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
14A
15
16
17
18
19
20
21
22
24
25
0 ¼ ½ ¾ 1 MILE

The firm transformer capacity provided would be adequate to serve system loads up to 1970. The substations C and D will require reinforcement to meet the load requirement beyond 1970.

Tenders for these works have been invited and subject to satisfactory finance being available for tenders, an award will be made by June, 1966 and all work completed before the end of 1966.

Rural Electrification

The subject of rural electrification has assumed an important place in the programme of electrical development of most of the developing countries. In Ceylon, as in most other countries in the ECAFE region, the population distribution is such, that 80 per cent of the Island's population is dispersd among hundreds of villages and hamlets. The balance 20 per cent are concentrated in the cities. 80 per cent of the population by necessity have to be in the villages due to their vocation. It will also be observed on past trends that the concentration of population in the towns has been a post-war development.

2. The rural population gradually migrated towards the cities to enjoy the enviromental comforts that were available there. This had a two fold effect. It not only created an acute housing problem in these areas but also led to the abandonment of the agricultural pursuits that those in the rural and village areas followed with a consequential increase in the number of unemployed in the cities.

3. There has been a tendency to consider rural electrification as provision electricity supply for lighting and similar amenities. Apart from the environmental comforts that electricity can provide to the rural areas, the most significant contribution electricity can make to these areas is in the form of power for both agricultural and industrial enterprises. From the larger perspective, lighting and similar amentities should be regarded as incidental benefit and emphasis should be laid on the use of electricity for productive purposes.

4. The benefits of rural electrification can generally be summarised as follows :

(*a*) It encourages the establishment of factories in the rural areas, where cheap labour and raw materials for particular industries are available.

(*b*) It provides electricity for lift irrigation specially in the arid zones.

(*c*) It provides power and incentive to develop cottage industries.

(*d*) It helps to increase the agricultural production by farm mechanisation and intensive cultivation.

(*e*) It discourages population converging to the cities and thus relieves the housing problem in the towns and urban areas.

(*f*) It provides an environment almost equal in comfort and convenience to that enjoyed in the cities and thus encourages rural welfare.

(*g*) It helps to raise the standards of living by providing additional job opportunities for people living in rural areas.

5. Although there is ample scope for the utilisation of electricity in rural areas, the chief difficulty in providing electricity to these areas, is the dispersed nature of the load and the low demand per installation, during the initial period of electrification. During the initial period, electricity is generally used in the areas for :

(*a*) Lighting,

(*b*) Irrigation purposes,

(*c*) Processing industries connected with agricultural operations such as rice, flour, etc.

6. As the load per mile of transmission of power to the rural areas is very small and the rural consumption is less, the revenue derived does not yield a reasonable turnover on the capital. This problem has to be weighed against the principle of providing a reasonably reliable and safe electricity supply at the minimum cost practicable to stimulate extensive and intensive utilisation of electricity.

7. Various methods are available for adoption in regard to the capital contribution policy for rural electrification. They are :

(*a*) A non-refundable contribution from individuals or groups of consumers to cover a portion of the capital cost.

(*b*) A loan from the prospective consumer to the supply authority, either bearing a low interest or interest free. The sum so loaned to be set off gradually against future charges.

(*c*) A Central Government loan to be recovered in instalments as the scheme begins to yield a return.

(*d*) An out-right payment by the Central Government to the electricity undertaking to meet a portion of the capital cost required for rural electrification.

(*e*) A Central Government guarantee to make good the loss that may be incurred by the undertaking in providing supply to rural areas.

(*f*) A taxation policy to enable the undertaking to build up a reserve to be utilised for the extension of electricity to rural areas only.

8. The Department, however, has embarked on an extensive scheme of electrification of rural areas, the capital being made available from the Department's General Reserves. The annual return the Department should be assured on schemes financed from the Department's reserves, should be at least 16¼ per cent. This is required to meet a nominal interest of 4⅜ per cent. on the capital invested, a depreciation charge of 3⅛ per cent of the capital,

operation and maintenance charge of 3 per cent of the capital, and the cost of energy delivered at the distribution centre of 5 per cent of the capital. But to encourage rural electrification, the Department has reduced the minimum return to 12½ per cent. The consumers however, are expected to meet the cost of the service connections, as well as the installation in their own premises. These conditions have placed a certain amount of burden which the rural population is unable to bear without assistance from either Government or from other sources.

9. A further development in the field of rural electrification is the Villages Scheme initiated by the Department, which was designed to provide supply to small villages where the anticipated annual revenue was not less than 5 per cent of the capital cost. In the provision of these supplies, the Department, apart from meeting the cost of the high voltage line, sub-station and low voltage line, also initially meets the cost of connecting the premises to the Department's lines, as well as the provision of the installation in the dwellings. The cost of the service connection and of the installation is thereafter recovered in 30 monthly instalments. These facilities are limited and in the first instance to 42 consumers in any particular village. In order to help those who were initially left out, a Revolving Fund has been created, into which the instalments recovered on the capital invested on the original scheme is credited and the Fund utilised to provide electricity to more consumers.

10. There are certain areas in Ceylon where large irrigation schemes are not practicable, but investigations have proved that rich water resources exist underground. Electricity can be used extensively to pump this water to the surface and thus bring large tracts of land under cultivation and also improve the yield. Apart from the use of water for irrigation purposes, an ample supply of water is required for other purposes in the farms. If maximum benefit is to be obtained from the livestock, an ample source of water supply is essential. The quantity of water required in a farm is estimated as follows :

For each person	35	gallons per day
For each cow	25	gallons per day
For each pig	5	gallons per day
For each goat	1.5	gallons per day
For 100 chicks	2.5	gallons per day

A plentiful supply of fresh water has been found to produce 10 to 12 per cent of more milk with a 6 to 12 per cent higher butter fat content. A hatchery supplied with fresh water has been found to provide 8 to 10 per cent more eggs and the availability of an automatic fresh water supply to the piggery has been found to increase the production by 17 per cent.

11. Electricity is also being used for threshing, in other countries. A threshing machine equipped with a 7.5 H.P. motor will suffice for a farm of 30 acres. Due to uncertain weather conditions in the tropics, it has been found

useful to resort to artificial grain drying. The basic process is the blowing of heated air and cold air through a layer of grain. For a 6 per cent extraction of moisture, the power required is a 5 H.P. motor and the consumption is in the region of 6 to 10 KWH per ton of grain.

12. Electricity can also be used for drying grass and herbage which is the the staple food of livestock. It has been found that high protein food for livestock can be obtained by rapid drying of the grass and herbage. The process requires the reduction of the water content from 85 per cent to 5 per cent. The electricity consumption varies with the conditions of drying from 80 to 230 units per ton dried.

13. Milking machines can be used with advantage where the heard of cattle is 15 or more. Electrically operated machines extract the milk in the natural way by a combination of vacuum and pulsating air pressure. The soothing uniform action of the electrically operated milkers prevent injury which often results from too vigorous hand milking. Pasturization is the only known method of making milk safe for human consumption. It has been found that milk taken from the cow contains bacteria which multiply rapidly between milking and pasturization.

14. Electricity is also being used in the dairy farms for feed processing. The processing of feed naturally increases the nutrition value, and is easily digestible. The mixing of the feed also prevents wastage as the heard will not reject any of the feed that might not be palatable. The daily grinding of the feed ensures freshness as well as preservation of vitamins.

15. Electricity has become a necessity for poultry breeding. In the field of poultry farming, electricity plays a very important role for both incubation and breeding. The best results are achieved by using electric incubators which facilitate close control of temperature, humidity and air circulation.

16. Another significant contribution electricity can make to the rural areas is the power it provides for cottage industries. Among the ECAFE countries, Japan's success in the field of electrical development has been phenomenal, and this success has been attributed to the decentralisation and the availability of power throughout the country including the rural areas.

17. If supply is provided to rural areas and improved tools required for cottage industries are provided in these areas, with financial and technical assistance, employment can be made available to the population in these areas throughout the year, and thus improve the standard of living.

18. The size of motors required for some of the cottage industries are as follows :

Single Unit Power Loom	1/2 h.p.
Wooden Toy Working	1/2 h.p.
Small Machine Shop	3 h.p.
Small Oil Extraction Unit	2 h.p.

19. The Villages Scheme referred to in paragraph 9 above was worked out in 1960 in conjunction with the United States Operation Mission. It embraced 50 villages which were in close proximity to the Department's Extra High Voltage transmission system, and only those villages which singly or in a group required one mile of transmission line per village, one mile of 3-Phase Low Tension Line and one mile of Single-Phase Low Tension Line to supply a minimum of 42 houses per village were considered for electrification, in view of the stipulation that the total all in cost per village should not exceed Rs. 65,000. The United States Operations Mission agreed to finance the local cost of electrification of the 50 villages from PL. 480 counterpart funds and a sum of Rs. 1,730,000 was allocated for this purpose. Before PL. 480 aid was withdrawn on the nationalisation of the Oil Supply Industry in Ceylon, a sum of Rs. 400,000 was utilised. The balance required for completing the work was provided from the Department's reserves. The 50 villages selected for electrification were :

(1) Udupila
(2) Delgoda
(3) Kanduboda
(4) Parangoda
(5) Dekatana
(6) Dompe
(7) Talawatugoda
(8) Talapathpitiya
(9) Madiwela
(10) Hindagala
(11) Gelioya
(12) Kossina
(13) Petiyagoda
(14) Menikbowa
(15) Daskara
(16) Gatakumbura
(17) Handessa
(18) Hiyarapitiya
(19) Naranwala
(20) Alapalawala
(21) Udispattu
(22) Makewita
(23) Mabima
(24) Weliveriya
(25) Embaraluwa
(26) Weboda
(27) Polgasowita
(28) Wethera
(29) Siyambalagoda
(30) Kahatuduwa
(31 to 34) Uswetakeiyawa—Villages
(35) Sangilipalama
(36) Niyangandora
(37) Kumbaloluwa
(38) Hendunawewa
(39) Naranpola
(40) Kalukondayawa
(41) Walgama
(42) Malwana
(43) Haloluwa
(44) Pothuwila
(45) Bopitiya
(46 to 50) 5 Villages between Maha Induruwa and Balapitiya.

Work on all these 50 villages is in full swing, the work on 14 of these having been completed. The schedule date for completing the balance is June, 1966.

20. The Department proposes to undertake the work of providing electricity to rural areas on a massive scale. In order to undertake this work, it proposes to set up a separate branch for handling all work connected therewith. The headquarters organisation will comprise of a Senior Engineer in charge with a small staff for the design of lines and substations from site data obtained by the Load Development Engineers attached to Area offices. The actual construction work will be carried out by the Load Development Engineers in the areas who will be provided with a squad of workmen with a supervisor and necessary transport. All material for the work will be obtained departmentally from countries having bilateral trade agreements so that a minimum of actual foreign exchange will be necessary. All material obtained for this work will be separately stored.

21. In order to effect economy in the capital cost of the works, the Department will amend its regulations in so far as Wind Pressures, Factors of Safety and Ground Clearances are concerned. In effecting such amendments, the safety of the public will not be impaired.

22. The target for the five years commencing 1966 is 500 villages at an average annual rate of 100 villages. The funds for the electrification of 100 villages commencing in the financial year 1965/66, viz a sum of Rs. 6,520,000, are, available from the Department's Reserves, Extensions and Renewals Funds.

Works Financed from R. E. & R. F.

Chapter 414 of the Ceylon Legislative Enactment provides for the Establishment of a financial reserve fund into which this Department's revenue Net Surplus is credited.

The purpose for which these reserves can be utilised are indicated by the Treasury, and they are—

(*a*) To meet expenditure of an unusual nature which has not permanent value of a very restricted permanent value. Example : Additional plant recently purchased which is not likely to possess any commercial value when the Hydro Electric Scheme comes into operation.

(*b*) To renew major assets purchased from Loan Account if renewals are needed long before the expiration of the period on which repayment of the loan is calculated (F.S minute of 19.2.40 in File 931/8 (SB).

(*c*) To replace plant which has become obsolete or wasted before the end of its life-time, or to pay of the outstanding annuity in respect of such plant, if it is decided that replacement should not be made (Minutes of the Board on T.P. 3/2 EB. of 30.4.36).

(*d*) To carry out extensive repairs necessitated by unforeseen circumstances (Minutes of Elect. Board on 30.4.36) e.g. floods.

(*e*) To provide for the finance of ordinary additions and improvements where it is thought preferable to make them from the fund rather than to borrow (F.S.' minute of 27.6.39 in File 965/95/2 (SB).

(*f*) To provide funds to cover any expected or unexpected loss in profits which may occur in any particular year (Minute of Elect. Board of 30.4.36).

During the last ten years, the net profits earned by the Department and the amounts transfered to the R. E. & R. F. are given below. The balance to the credit of this fund as at 1.10.65 which can be utilised for further works is Rs. 37,698,470.

		14,085,269 (*balance brought*) *forward*)	
Year	*Total Profit Rs.*	*Amount Transferred to R.E. & R.F. Rs.*	*Expenditure on R.E. & R.F. Rs.*
1955–56	3,536,090	4,222,456	4,222,457
1956–57	4,161,281	3,536,090	6,981,046
1957–58	5,595,352	4,161,281	1,696,435
1958–59	7,724,097	—	2,964,211
1959–60	10,243,686	2,000,000	3,572,662
1960–61	11,442,821	7,724,097	1,647,795
1961–62	9,204,654	10,243,686	2,215,067
1962–63	10,616,193	11,442,821	3,633,737
1963–64	11,116,901	4,607,327	3,584,120
1964–65	6,906,424	11,116,901	4,923,928

As at present the funds from the R. E. & R. F. are used by the Department for the following work :—

(*a*) Purchase of spares

(*b*) Extension to existing transmission and distribution lines.

(*c*) Provision of new consumer sub-station.

(*d*) Augmentation of existing sub-station.

(*e*) Provision of new lines to have better voltage and better system control.

(*f*) Rural Electrification.

(*g*) Buildings for stores and housing for Departmental personnel.

In the year 1965-66 a sum of Rs. 12,960,549 is to be used for the following works, funds being drawn from this fund :—

	Rs.
(1) Improvements to Colombo distribution	2,481,790
(2) Spares and renewals for generation	1,767,500
(3) Improvements to transmission and distribution in areas out side Colombo	5,777,309
(4) Buildings and welfare	1,493,950
(5) Rural Electrification	870,000
(6) Other items	570,000
Total	12,960,549

Staff and Employment Possibilities

The poor maintenance, the resultant frequent failures and the slow progress of work is attributed mainly to the lack of adequate staff.

In 1958, the total number of staff employed was 3,641 and at the end of the financial year 1963-64 was 4,433, an increase of only 21%. While the system has recorded a steep growth, as observed from the following figures :—

The number of units sold increased by 98%.

The number of consumers increased by 45%.

The number of miles transmission and distribution increased by 75%.

The number of transformer substations increaed by 88%.

The capital assets increased by 92%.

Apart from the staff that will be required for major projects such as the construction of the Polpitiya and Samanalawewa Projects and the transmission facilities and the organisation required for Rural Electrification which has been indicated under the Chapter on Rural Electrification, a modest estimate of the minimum staff required is indicated in the manpower requirements schedule given below.

Manpower Requirements—1966/67–1969/70

Category of Skill	*No. in Employment*	*No. of Vacancies 1965*	*Extra Personnel Required* 1966	1967	1968	1969	1970
Technological & Executive Engineers							
Civil	8	9	—	3	1	1	1
Mechanical	5	2	1	1	1	1	1
Electrical	126	10	1	19	15	17	19
Research & Training							
Chemist	—	1	—	—	—	—	—
Executive & Other Commercial							
Asst. Accountants	9	—	2	1	—	—	—
Technicians — Engineering & Industrial (Higher Grade)							
Draughtsman	17	3	—	2	2	2	3
Drawing Office Asst.	1	—	—	—	—	—	—
Foreman	210	36	13	32	29	32	35
Technical Assistant	12	4	—	1	1	1	2
Surveyors	2	8	—	10	2	2	2
Commercial & Other							
Minor Supervisors	83	27	—	60	17	18	20
Stenographers	11	8	—	1	2	2	2
Typists	72	8	3	20	10	11	12
Trade & Crafts							
Blacksmith	4	1	—	—	—	—	—
Carpenter	33	7	—	4	4	5	5
Drivers—Motor Vehicles	122	22	5	20	16	18	20
Electricians	30	1	—	2	3	2	4
Fitters	111	20	10	14	15	15	17
Masons	29	6	—	3	3	3	4
Mechanics	6	2	—	1	1	1	1
Operators—Telephone	26	3	1	3	3	3	4
Turners	6	3	—	1	1	1	1
Operators (S.B.O.)	48	7	—	5	6	6	7
Printers	10	3	—	1	1	1	1
Linesman	160	34	7	6	6	6	6
Wireman	270	14	6	5	5	5	3
Jointers	28	9	5	4	4	4	4
Meter Readers	39	8	5	5	5	5	5
Labour (Semi-skilled)	700	134	50	25	25	25	25
Labour (Unskilled)	1,235	250	50	40	40	40	40
Labour on Casual Basis (should not be included as permanent staff)	200	—	—	60	50	50	50
Commercial Bakers							
Book Binders	3	2	—	—	—	—	—

Trends of Electricity Tariffs and Cost of Power and Power Market

The average cost per unit of product is determined by dividing the total expenditure incurred in the process of production by the quantity produced. The cost calculation in the case of Electric Power Supply has to take into consideration other factors such as the pattern of electricity consumption by different categories of consumers, the wide variation in time of use, the load factor, and the diversity between different consumers.

The cost of Electrical Energy will depend not only on the pattern of generation but also on the pattern of consumption.

The basic policy in the establishment of Electricity rates should be primarily to obtain adequate revenue to cover all the costs associated with providing the service. The price policy and the determination of rate level for a power utility enterprise, whether Government owned or privately owned, are also governed by the extent and character of the service rendered to its customers

It is sometimes maintained that power rates should be fixed with consideration not only for the overall cost of the service, but also for other economic factors, including the relation of the electricity industry to the national economy and the impact of the price on the customers. Overall cost, which is the most important consideration in rate fixing includes adequate provision for replacement of facilities and a reasonable return on capital invested. Several other considerations are often brought out, but these should not be given undue emphasis. For example, socio-economic factors may affect the relation of rates and cost of service and they may be given consideration as far as possible. The impact of the electricity industry on the development of other sectors of the economy may also have to be considered in fixing rate levels. As the cost of service in current monetary units will change in an inflationary situation, appropriate adjustment of the rate schedule may have to be considered.

With regard to investment, a basic premise for a utility service is that it will continue to exist at least beyond the term of any current indebtedness. In consequence, capital is considered to be invested permanently in the utility. Alternatively, if elements of the capital are amortized, replacements of original assets should be financed with new capital. Consideration must be given to the revenue — producing ability of rates to meet these requirements.

Summarising, it may be stated that electricity rates should be based on what the energy costs to produce and supply, but it is often necessary to take into consideration various other factors, such as the value of the use of electricity to the customer, the ability of the consumer to bear a given rate, apportionment of the cost incidence due to the special load characteristics of a given class or classes of consumers and the need or possibility of differential rates for different classes of consumers which would amount to one class subsiding another.

In most countries of the region the electric power industry is operated by a public utility, private or government-owned. The rates for electricity supply are determined basically on the business principle that the sale prices should bear a fairly definite relationship to cost of service, including a fair return on investment or debt service charges. The rate is usually uniform for each class of customer, regardless of the ability to pay and the value to the consumer. While the specific rate structure may not appear to have any very close relationship the relative costs of service to different classes of consumers, it is, in fact, present to an important degree. In other words the rates are usually designed in accordance with the principle, " Let the beneficiary bear the burden".

It has been widely recognized that an adequate supply of quality electric power is of vital importance to the welfare of the community and the growth of industry. In order to meet this requirement it is essential that the power rates should be set high enough to assure the public utility of its continued sound operation and ability to attract further capital needed for growth and development.

In developing countries because of the shortage of capital resources, inflation and other reasons, the capital market for long-term loans is usually lacking and the interest rates for short-term loans are extremely high. For most public utilities in this region, the self-generated funds from the depreciation allocations and return on investment are not enough to meet the capital requirement of power system development programmes. Loans have to be sought from internal financial institutions as well as external sources. In order to secure these loans, the utility must be financially sound so that annual rate of return on the investment will be attractively high (say 10 percent). Self-generated funds from internal resources such as depreciation allocations constitute an important percentage of total capital investment. By such means, the ratio of total debt to total assets can be lowered. To meet these requirements, the power supply rates have to be maintained at a reasonably high level. This principle would however, be in conflict with the desire in some countries to reduce the burden on certain classes of customers, rural for instance.

The "ability to pay" principle implies in effect that the power rates should depend, on the personal income status of the consumers. It rests on the belief (*a*) that public utility services are an essential rather than a luxury and (*b*) that persons of low income should not be deprived of essentials of living by their inability to pay the full costs. The objections to this principle are two fold. First, its application would raise formidable difficulties of administration. Second, the public policy of reducing income disparity can be accomplished by alternative instruments of social control, including progressive taxation, social security and free education, more easily and less harmfully than by a system of discriminatory prices. In many countries of this region the capacity of eletric power supply is lagging behind the demand

and the available limited eletric power should be effectively and economically utilized. In such circumstances, the rate should be designed on the basis of cost rather than the ability to pay principle. However, overall national policy in a country may warrant the use of reduced tariffs for any class of consumers, even at rates below cost. In such cases, it is expected that the State will make good to the Undertaking the difference in revenue.

The ultimate cost of electricity produced and supplied is affected by several factors inherent in the power system, as well as on the pattern of demand. The various cost components may show wide variations from country to country. For example, the item under wages and salaries may be dependent on the design and size of a power station, degree of automation and perhaps also the Government's labour policy and the strength of labour unions. For these reasons, a comparison of the overall costs of electricity supply in different countries should not be attempted superficially, but should include a detailed analysis of the component costs.

The cost per kW. depends solely on the capital cost involved and in Ceylon includes the following items of expenditure :—

(*a*) Cost of the equipment.

(*b*) Customs duty on imported materials.

(*c*) Commitment charges on foreign drawings.

(*d*) Consultants fees.

(*e*) Supervision and labour charges.

(*f*) Interest during construction.

(*g*) Freight.

In Ceylon the capital cost is high due to the following reasons :—

(i) Customs duty on imported equipment which is approximately 17% of the cost of the capital equipment.

(ii) Commitment charges is more in Ceylon than in other developing countries as a project takes considerably longer period to complete.

(iii) The consultants fees is approximately 4–4½% of the capital cost In U. K. and other Western countries consultants services are sought only for specific items of work.

(iv) Supervision and labour charges in Ceylon are high as the average output of Ceylon labour is far below that of his counterpart in any other country.

(v) The Department has to pay interest during construction as all the capital has to be on borrowings.

(vi) The Department has to meet the cost of freight.

In U. K. a major portion of the cost is met from Reserves and from Central Government loans which are treated as equity capital. All the necessary equipment are also purchased locally. Hence, expenditure on customs duty, commitment charges on foreign borrowings, freight charges, consultants fee and interest during construction are not payable. This helps the U. K. Boards to keep down the cost of any project within reasonable limits.

The cost per KWH. depends on—

(*a*) Annuity payment on the capital invested.

(*b*) Operation and Maintenance charges.

The annuity payment depends on—

(*a*) The interest on the loan.

(*b*) The repayment period.

In U. K. the loan is not repayable and only a depreciation fund is created which is less than loan repayments.

In Ceylon, however, all borrowings are repayable with interest.

The two principal sources of borrowing have been—

(*a*) I. B. R. D.

(*b*) Local Loans.

Only during the last two or three years an attempt has been made to utilise the Department's reserves to meet the domestic funds required for the second Thermal Set.

The I. B. R. D. loans cover three major projects namely, Stage IIA, Stage IIB and the 1st and 2nd Thermal Sets. Stage IIA and IIB loans are repayable over a period of 21 years with an interest of 4¾% and 5¾% respectively, while the composite life of a Hydro Scheme is 50 years. In the case of the 1st Thermal Plant the loan is repaid over a period of 17 years while the life of the Plant is 25 years. The loans on the 2nd Thermal Plant is repayable over a period of 21 years while the life of the plant is 25 years.

The loans from the Local Loan Funds though payable over the life of the asset, yet carries an interest ranging between 3¾% and 4¾%.

The Department therefore pays more than U. K. authorities, against amortisation of loan. This places a heavy burden on the Department's finance.

In regard to operation and maintenance of Thermal Power Stations in Ceylon we have to depend on imported fuel which carries a custom duty of approximately 30%. The cost of a ton of furnace oil is Rs. 130.20 cts. of which the custom duty alone amounts to Rs. 39. The Department also pays a few million rupees as payment in lieu of Income Tax.

Summarising the above, the cost per KWH. generated in Ceylon is adversely affected by the following reasons :—

(*a*) Customs duty on imported machinery.

(*b*) Customs duty on fuel.

(*c*) Less favourable interest rate and shorter repayment period.

(*d*) Payment in lieu of Income Tax.

(*e*) Freight.

It has however, been felt that a study of the existing Tariffs should be undertaken and the Power Cost and Power Development Committee to which reference has been made previously is presently engaged in this task.

Power Market

Market for power in a developing country always provides an ever increasing horizon. Firstly, to meet the individual requirements of the country and secondly, to meet the demand consequent to increased activity and the growth of population.

There is a considerable amount of imbalance of the natural resources of the various countries. For instance, some countries in the West are endowed with an abundance of natural resources such as coal, natural gas and oil, while some of the countries in the East are short of these natural resources, though they have an abundance of Hydro power.

There are, however, some regions where the limited supply of natural resources is insufficient to meet the countries needs. This to a considerable extent can be met by means of joint development of projects and exchange of power across international borders.

The first such interchange of power was between the United Kingdom and France. In the Eastern sector a striking example of joint development of power projects to the inter-regional co-operation in the development of the lower Makong Valley the participating reparian countries are Cambodia, Laos, Thailand and Viet Nam.

Similar exchange of power is possible between South India and Ceylon. There is scope for developing the Mahaveli Hydro Electricity cum irrigation which has a power potential of about 250 MW. Ceylon will be in a position to deliver to the Southern part of India, the major part of this power for about 15 years. The key advantage of this Scheme to Ceylon will be that its irrigation potential would get developed sooner and help the otherwise difficult food situation.

The use of electricity for traction provides another potential market which will require a very large block of power. This can be most economically met from the Hydro potential available in the country.

Some of the advantages are—

(i) Reduction in travelling time.

(ii) Frequent service.

(iii) Low repair and maintenance cost.

(iv) Fuel used is indigenous.

Capital and Phased Financing

Capital has been made available from four different sources for the works enumerated above. They are—

(i) Loan Funds. This has been provided by the Central Government. The loan period varies from 25 years to 50 years and the interest has varied within fairly close limits of 3½ to 4¾ percent per annum. In most other countries these loans are treated as Equity capital.

(ii) The Department's Reserves. This amount is not repayable.

(iii) Loans from the International Bank for Reconstruction and Development. Particulars of the loans are as follows :—

(*a*) Loan Agreement No. 101 CE. A sum of $19,110,000 was provided in 1954. This amount is repayable over a period of 21 years at 4¾ percent as bi-annual instalments.

The major items of works for which this loan was provided are—

(i) The Castlereagh Dam.

(ii) Waterways.

(iii) Laxapana Power Plant of 25,000 kW. capacity.

(iv) The following transmission system :—

Laxapana to Colombo.
Peradeniya to Kurunegala.
Colombo to Bolawatte.
Norton Bridge to Badulla.

(v) 325 miles of 33kV. and 11kV. transmission system and 200 consumer substations.

(vi) The replacement of the 11kV. ring in Colombo by 33kV.

(*b*) Loan Agreement No. 209 CE. dated 17th September, 1958. A sum of $7,400,000 was provided and is repayable over a period of 17 years at 5¾ percent. The repayments to be made in ½ yearly instalments.

The works undertaken were—

(*a*) A single Turbo geneartor unit having a capacity of 25,000kW. and operating at about 900 p.s.i.g. and 900°F.

(*b*) 178 miles of 33kV. sub transmission facility and 200 consumer substations.

(*c*) Loan Agreement No. 283 CE. dated 6th June, 1961. A sum of $15,000,000 was provided and is repayable over a period of 21 years at 5¾ percent to be paid in bi-annual instalments.

The works undertaken were—

(i) Norton Bridge Hydro-Power Station with a generating capacity of 50,000kW.

(ii) A single Turbo generating unit having a capacity of 25,000kW. and operating at 900 p.s.i.g. and 900°F.

(iii) The following transmission facilities :—

(*a*) A 132kV. D.C. line from Norton Bridge Station to Laksapana Power Station.

(*b*) A 132kV. D.C. line between Laksapana and Galle.

(*c*) A 132kV. D.C. line between Bolawatte and Puttalam.

(*d*) 200 miles of 33kV. sub transmission line and 200 consumer substations.

The savings from the above loans are now being used for the construction of the fourth substation and augmenting the Classen Place and Pettah Primary substations.

(iv) Loans from the Export Credit Insurance Corporation. The loan is for $10,800,000 and is repayable over a period of 12 years at 6 percent. As the loan is available for the purchase of equipment and service in Canada, Contractor's Credit facilities were also obtained for financing this project.

Investments on power projects in other countries are usually not considered as loans, specially in the developed areas, but as equity capital the undertakings is, however, required to make provision for interest as well as to create a depreciation fund. This financial arrangements places a lesser burden on the undertakings than the loan repayments.

Attracting foreign capital for power development has also to be considered. Most lending agencies, particularly, the World Bank, believe that an undertaking should provide a surplus out of which to repay all loans and in addition they should permit the setting apart of a sufficient amount to cover a reasonable part of the cost of further expansion and replacement.

CHAPTER IV

STUDIES ON

Market Study

Market study is undertaken for three different purposes—

(i) Long term forecast covering 10–20 years which helps formulate general power policy as well as national policy.

(ii) Medium term forecast covering 5–10 years which will guide the immediate power development plan.

(iii) Short term forecast covering 1–3 years which is useful for programming operation and maintenance and for budgeting purposes.

The market study undertaken in a developed country differs from that undertaken in a developing or undeveloped country. Under conditions of stable economy, past records is the major tool for establishing the future trends· But for developing countries which usually do not have sufficient statistica data and which follow the method of planned economy, policy consideration will considerably influence in making the forecast.

For most developing countries the simple and practical procedures are adopted. It is, however, customary to adopt more than one method and the results arrived at by various methods are checked, compared and reconciled·

The Department's market requirements were worked out by determining the requirements of the different consumer groups or sections and on past trends.

Past Trends

The rate of increase of consumption during the years 1959 to 1961, was as follows :—

	Percent
(i) Domestic	11·5
(ii) General	93
(iii) Local Authority	20·9
(iv) Industries	16·9

Since the time restrictions were planned on the import of domestic and other consuming appliances the increase in consumption by the various sectors indicated a sharp decrease as seen from the following figures :—

	Percent
Domestic	2·60
General	4·45
Local Authority	8·43
Industries	11·00

The present forecast was, however, based on the following annual increase:—

(*a*) All loads other than industries 7 percent per annum from 1965 to 1969 and 8½ percent from 1970 to 1974.

(*b*) Plantations and other industries at 13 percent per annum.

(*c*) Heavy and medium sized industrial and other loads, on figures given by the industries.

In projection (*c*) above, more or less committed loads have been taken. For instance the K.K.S. Cement Factory has indicated a requirement of 4,400 kVA. by early 1965, 8,500 kVA. by end of June, 1965 and 13,000 kVA. by 1968. The purchase of this large load of 13,000 kVA. was, however, contingent on the Department extending the grid to Jaffna by this time.

The projections cover only a period of 10 years and has to be reviewed annually and in all probability in the upward trend. The load forecast and the plant availability indicates that the undertakings will experience a power shortage in 1971/72, which will be adequately looked after by the Samanalawewa Multipurpose Project.

The finance that will be required during the five year period would be as in the annexed statement.

ESTIMATED COSTS OF THE PROJECTS IN Rs. MILLIONS

Projects	*Foreign*	*Local*	*Total*	
1st Thermal Set	35·150	25·311	60·461	
2nd Thermal Set	14·280	8·400	22·680	
Hydro Stage IIB	57·120	74·900	132·020	
Maskeliya oya Stage I	89·530	92·407	181·937	(since revised)
Transmission, Stage I	61·123	55·476	116·599	
Samanalawewa	76·582	46·446	123·028	(Excludes cost allocated to irrigation projects and interest during construction)
Transmission, Stage II	154·636	80·717	235·353	

PHASED EXPENDITURE IN Rs. MILLIONS FOR THE FIVE YEARS PERIOD 1965/66 TO 1969/70

Projects	1965–66		1966–67		1967–68		1968–69		1969–70	
	F.	D.	F.	D.	F.	D.	F.	D.	F.	D
1st Thermal Set & Hydro	8·300	11·000	6·194	20·414	—	15·000	—	—	—	—
2nd Thermal Set	1·957	·529	—	5·500	—	—	—	—	—	—
Maskeliya Oya, Stage I	18·287	2·200	18·525	48·700	18·000	28·460	34·718	13·047	—	—
Maskeliya Oya Transmission	12·000	3·000	20·000	15·000	25·000	20·000	4·123	13·047	—	—
Samanalawewa Power	—	—	—	—	2·495	1·672	16·509	11·308	17·993	10·458
Samanalawewa Transmission	—	—	—	—	15·463	8·071	30·926	16·142	30·926	16·142
Total	40·544	16·729	44·719	89·614	60·958	73·203	86·276	53·544	48·919	26·600

Note 1.—Expenditure on the Samanalawewa Power Project and Transmission facilities will, however, continue for a further period of two years. The phased expenditure on the two Projects for the additional two years will be as follows :

	1970–71		1971–72	
	F.	D.	F.	D.
Samanalawewa Power Project	28.789	16.733	10.796	6.275
Transmission, Samanalawewa Praject	46.389	24.213	30.932	16.149

Note 2.—Samanalawewa Power Project will be completed by 1970–71 (to meet the anticipated Power shortage) ; The expenditure for the same in 1971–72 would be mainly for the payment of retention fees and other allied payments.

Note 3.—The above phased estimated expenditure does not include provision for any other Projects such as Makseliya Oya Stages II and III, Mahaveli Ganga Project, which are under consideration and what may be commenced during the above period.

(*a*) Electrification of Ceylon Government Railway

1. The subject of railway electrification has been under constant review since 1953 by the Association of American Railroads (AAR) and the American Railway Engineering Association (AREA). They have presented reports relative to railway electrification and have reached a number of logical conclusions about the application of economics of electrification.

2. Quoting from 1964 report of the Committee, the conclusions reached are—

(*a*) The growing economic advantage of electric motive power over forms that carry their own power plant, i.e. the advantage of the electric locomotive which draws its power from public utility mains over the diesel-electric locomotive which generates its electric power by means of a diesel engine on the locomotive itself. The diesel locomotive is limited in power to the size of the prime mover that can be carried within the limits of permissible axle loading. Although it has produced many economics in railroad operation it is expensive to service, uses a fuel that is constantly increasing in cost and has a high weight-to-horse power ratio. The electric locomotive, on the other hand, with its ability to concentrate a large amount of power into a single unit, has a low weight-to-horsepower ratio, uses central station power that is increasing in cost much more slowly than fossil fuels, and does not incur the high cost of servicing as the diesel engine.

(*b*) The standardisation on a contact system of 25 kV single phase at commercial frequency (in Ceylon 50 cycles per second). Such a system will enable railroad investment to be kept to a minimum and at the same time obtain the advantage of specialised operation of power facilities by the public utility.

(In Ceylon, practically the whole railroad system can be supplied from the existing or proposed 132 kV, and 66 kV. Grid Transmission System at a very small capital cost).

(*c*) There are no technical deterrents to the 25 kV. 50 cycles system for railway electrification. Such deterrents as phase unbalance, inductive influence on wired communication systems and high cost of signal systems have been largely eliminated.

(*d*) Electric operation should be considered by a Railroad Authority—

(i) When its motive power needs extensive replacement, and

(ii) Where electric power can be purchased at an attractive rate.

(iii) Where competitive conditions demand superior operating characteristics with economy.

Railway electrification will offer attractive economy possibilities where the railroad load factor is as high or higher than that of the industrial load. The diversity factor relative to the industrial load can also make the railway load attractive.

To show how these economics may be made, it is necessary first to study the comparative operating expenses of electric and diesel-electric line-haul motive power. It has been the experience of one railroad that operates large fleets of both electric and diesel-eletric locomotives that the maintenance cost of diesel-electric locomotives required to do the same work greatly exceeds the cost of maintaining the equivalent electric locomotives. While it is too early to predict the maintenance cost of the latest rectifier-type electric locomotives, the early indications are that their maintenance cost will not exceed 25 percent of the cost of maintaining the diesel-electric locomotives of the same age in the same service. The cost of maintaining the new lcocomotives during their first year of service is approximately one-third of the cost of maintaining the 30 year-old electric locomotives that they replaced. A study showed a larger percentage increase in the cost of maintaining diesel-electric locomotives with increased age.

Where traffic density and long runs between terminals at high scheduled speeds require a large amount of locomotive horsepower per mile of track, the savings in maintenance become large enough to justify the expenditure of roadway facilities required for electric operation.

Modern diesel engines consume 0·365 lb. of fuel per brake horsepower under standard conditions. When allowance is made for power consumed by auxiliaries and for transmission efficiency this amounts to 0·067 gal. per rail horse-power-hour. A power input of 9·95 kwh. is required at the high side of the substation per each rail horsepower of an electric locomotive. Diesel-electric locomotives, particularly in the North, are operated so that approximately 0.075 gal of fuel are consumed by the average diesel-electric locomotive for each rail horsepower-hour that it produces. The cost of power for an electric locomotive motive must therefore be 8 miles to be equal to the cost of fuel at 10 cents per gal. However, fuel cost is not the major economic factor. Maintenance usually occupies first place.

Older unsupercharged diesel engines have a fuel rate approximately 10 percent higher than modern supercharged units. When these units predominate, 9 mills power will be equivalent to fuel for diesel-electric at 10 cents per gal.

Therefore, if electric power can be purchased for 0.8 cents per kwh, it will be seen that this is comparable to present fuel costs with most diesel-electric operation, i.e. 10 cents per gallon.

The diesel-electric locomotive is really an electric locomotive handicapped by the necessity of carrying its own power supply. It should conceivably be less costly to build an electric locomotive than a diesel-electric in quantity production. Concurrently, the high powered A.C. electric locomotive is selling for about the same price per rail horse-power as the lower-powered diesel-electric.

The rectifier-type locomotive can use the same tracks and motors as have been used by a large number of diesel-electric locomotives. The locomotives with six axles and all axles motored can therefore be re-manufactured for use on electric locomotives. It is also conceivable that the trucks and motors from four-axle units could be re-used economically for a large scale electrification program.

This gives the electric locomotive the same advantage as diesel-electrics from the standpoint of re-manufacturing old diesel-electrics into either electrics or new diesel-electrics as long as the horsepower requirements of the new locomotives can be satisfied by the old motors.

The costs for signal and communication changes required by electrification can be quite reasonable if planned changes are made in advance.

(*e*) Summarising the above :

(i) The principal economy that electric operation can show over diesel operation is in motive-power repair costs. There is also an appreciable saving in crew costs, since the electric locomotive will weigh less per rail horsepower than the diesel-electric, to do the same job.

(ii) Where electric operation can be applied to traffic of sufficient density, the return on the additional investment required compared with replacing the old diesel-electric locomotives with new ones when measured over the life of the equipment involved, can be sufficiently attractive that the additional advantage in service to customers will enable the railroads to increase their gross revenues and at the same time reduce costs.

(iii) When fuel costs advance, as they must, the financial return with electric operation will be greater. With continued diesel operation, the operating costs will increase.

3. The above conclusions are equally if not more applicable to the situation in Ceylon. Electricity is a decreasing cost business. With the increase in the consumption the average cost decreases. The same cannot be said of the diesel operation. The cost of diesel operation will mostly depend on the world market conditions.

(*b*) Maskeliya Oya Stage II & III

The Department will carry out site or geological surveys on Stages II & III of the Maskeliya Oya Power Project.

The construction of Stage II of the Maskeliya Oya Power Project will involve the construction of a rock filled dam at Theberton and water conveyance by a tunnel with penstocks and a power plant at Laxapana at close proximity to the existing power plant. The Power Plant with a capacity of 50 Mw. initially has provision for ultimate development up to 75 Mw. for peaking purposes.

The construction of Stage III of the Maskeliya Oya Project will involve the water conveyance from Mousekelle Dam site by a tunnel with penstock and a power plant at Theberton with an installed capacity of 22·5 Mw. The completion of Stage III of the Maskeliya Oya Project ensures that the water of Kehelgamuwa Oya and Maskeliya Oya are used thrice over prior to running on to the Kelani Ganga.

The total cost of Maskeliya Oya Stages II and III has been estimated at Rs. 145·0 million excluding cost of transmission. Of this amount Rs. 80·0 million represents the foreign costs and Rs. 65.0 million represents the domestic expenditure.

The scheme is expected to yield 400 million units annually from both Stages and at 10 cents per unit would give a revenue of Rs. 40 million.

The benefit/cost ratio of Stages II & III is of the order of 3·8.

(*c*) The Samanalawewa Project

This is a multipurpose project which involves the construction of an earth dam across the Walawe Ganga at its confluence with Belihul Oya. The water from this storage reservoir so formed will be conducted through a tunnel to a forebay reservoir formed by the construction of a rock filled dam across the Diyawini Oya. From here the water will be dropped through penstocks down a 1000 feet escarpment to a power house to be constructed on the shores of the Katupai Oya. The capacity of the power plant to be installed is 90 Mw. at the start with provision for a maximum capacity of 150 Mw. The total cost of the Hydro Electro portion of the Project excluding subtransmission amounts to Rs. 137·8 million of which Rs. 81·6 million constitute the foreign cost and Rs. 56·2 million represents the domestic expenditure. The balance cost of a total of Rs. 189 million is attributed to irrigation.

The scheme is expected to yield 361·4 million units annually and at 10 cents per unit would give a revenue of Rs. 36.1 million. The other benefits available from this multipurpose project are the irrigation facilities available for 46 thousand acres of paddy cultivation downstream of the Katupai reservoir and the intangible benefits thereof.

The benefit/cost ratio in the case of Samanalawewa taking the Electrical benefits only into consideration is of the order of 3·5; the agricultural, irrigational and social benefits when evaluated would give a very much higher overall benefit/cost ratio for the same.

(*d*) Transmission and Distribution Facilities Under Samanalawewa Project

132 KV. Transmission

A 132 KV. Single Circuit Transmission Line with " Lynx " A.C.S.R. Conductors about 60 miles in length will be constructed from Balangoda to Colombo via

Agalawatta. This will provide supply to a new 2×7·5 MVA, 132/33 KV. Grid Substation at Agalawatte, the Grid Substation at Ratmalana and also transmit power to the Centre Gravity of loading at Colombo.

Another 132 KV. Single Circuit Transmission line with " Lynx " A. C. S. R. Conductor about 35 miles in length will be constructed from Samanalawewa Switchyard to Badulla Substation. This line will provide an infeed at Badulla through 15 MVA, 132/33 K. V. Transformer.

132 KV. Switching Facilities

132 KV. Duplicate Transmission Lines will link up the Balangoda Switiching Station and Samanalawewa Hydro Power Station. The existing 2×5 MVA., 132/33 KV. Grid Substation will be converted to a Switching Station with Duplicate/Reserve Bus having the following switching facilities for the control of—

(*a*) The incoming 132 KV. duplicate lines from Laksapana

(*b*) The incoming 132 KV. duplicate line from Samanalawewa about 10 miles in length.

(*c*) The outgoing 132 KV. duplicate lines to Galle.

(*d*) The outgoing 132 KV. single circuit line to Colombo via Agalawatte.

(*e*) Two transformer feeders for Balangoda (existing).

(*f*) A Bus coupler.

(*g*) A spare 132 KV. feeder.

Sub-Transmission and Low Tension Facilities.

About 1,000 Miles of 33 KV. Sub-transmission lines will be constrcuted to absorb the power from the existing network as well as from extensions through 2,000 new consumer substations and 3,000 miles of low tension distribution lines.

Expenditure

The total cost of the above-mentioned facilities including customs duty on imported materials is estimated at 235·353 million Rupees made up Rs. 154·636 millions Foreign and Rs. 800·717 millions domestic.

CHAPTER V

ORGANISATION OF THE ELECTRICITY SUPPLY INDUSTRY & PROPOSED CENTRAL ELECTRICITY BOARD BILL

The important role that the electricity supply industry has to play in the overall development of the country and the unsuitability of the existing organisation to play this vital role has been stressed by various authorities, from time to time. The International Bank for Reconstruction and Development, in its report in 1952 on the economic development of Ceylon, stated that: "The present electricity organisation in Ceylon is inadequate to deal effectively with the operation and maintenance of a large high tension grid switching in a parallel hundreds of MW., let alone the large development programme". It further stated that: "Strict control by the Ministry together with subordination of the E. U. D. to Treasury regulations seriously hampers the organisation wherever major decisions have to be taken."

Similar views have been expressed by Mr. J. G. Park, the Engineering Adviser to the Government, in Sessional Paper No. XVII of 1957, in his report of the inquiry into the Electricity Supply Industry. It may be mentioned that Mr. Park was commissioned by the Government in 1956, to—

(i) Review the organisation of the public generation, transmission and distribution of electricity ; and

(ii) Make recommendations as to the organisation required for the future development in the national interest of electricity supplies in the Island.

Mr. Park after investigating the set-up of the Department of Government Electrical Undertakings and those of the Local Authorities, concluded that the existing organisations were not suitable, if the Electricity Industry was to make its vital contribution towards the National Economy.

The reasons adduced by him were—

(*a*) The strict control exercised by the Ministry and the Treasury, seriously hampers the organisation whereever major decisions had to be taken promptly.

(*b*) The operation of Government's commercial and industrial activities do not fall conveniently within the scope of the Financial Instructions applicable to ordinary Departments.

(*c*) The business management of the Electricity Industry, which so vitally enters into the life of the community, should be unfettered by the need for accounting for the day to day management of the activities.

Dealing with the Electricity Supply Organisations in the Local Authority areas, Mr. Park observed that—

(*a*) Very limited development in these areas have been recorded.

(*b*) Local Authorities operate the scheme on a profit motive.

(*c*) The charges for electricity are higher in these areas than in areas supplied by the Department of Government Electrical Undertakings.

(*d*) The diversity of control was inimical to the efficiency ; and

(*e*) The attendant economies of large scale operation were lost.

Mr. Park, therefore, recommend that the Electricity Supply Industry should be transferred in its entirety to a statutory Corporation responsible to the Minister and through him to Parliament.

The duties and powers of the Board or Corporation should include the following :—

(i) To promote, co-ordinate and improve the generation, transmission and sale of electricity in the Island.

(ii) To conserve and develop all such water power resources as may be required for the generation of electricity.

(iii) To generate or acquire supplies of electricity and to transmit and distribute these supplies for sale, to the persons who would require them and where there is a reasonable prospect of their being remunerative.

(iv) To secure as far as practicable the development, extension to rural areas and cheapening of supplies of electricity.

(v) To provide, sell or let on hire electric lines fittings, apparatus and appliances for lighting, heating or motive power and for all other purposes for which electricity can or may be used.

(vi) To maintain shops and show-rooms for the display, sale and hire of electrical fittings and conduct display, exhibitions and demonstrations of electrical fittings and generally do all things incidental to the promotion and encouragement of the use of electricity.

(vii) To acquire the electricity undertaking or any licenced undertaker.

(viii) To make provision for advancing the skill of persons employed by the Board and for improving the efficiency of their equipment and the manner in which it is to be used.

(ix) To promote the welfare, health and safety of persons in its employment.

(x) To determine the terms and conditions of employment of persons employed by the Board.

(xi) To conduct itself generally as a self-supporting commercial concern and to secure that the Board's revenue is sufficient to meet its outgoings properly chargeable to revenue account taking one year with another, so, however, that it is not required to make a profit.

It is expected that a bill incorporating the above recommendations will be placed before the House of Representatives in 1966.

Another Committee has been appointed by the Hon'ble Minister of Land, Irrigation & Power to look into certain other aspects of the D.G.E.U. This consists of—

Mr. J. N. Goswami, Power Project Adviser to the Department of National Planning (Chairman).

Mr. E. L. P. Jayatilleke, National Planning Department.

Mr. R. G. Gomes, Asst. Director, Supply & Cadre, Treasury.

Mr. S. W. Peiris, Acting General Manager, Electrical Undertakings.

Mr. C. P. Sriwardena, Asst. Secretary, Ministry of Land, Irrigation and Power.

Mr. V. R. Charavanapavam, Chief Commercial Officer, Department of Government Electrical Undertakings (Member & Secretary).

The terms of Reference and Appendix to the terms of Reference are as follows :—

(1) To study the present cost of power generation, transmission and distribution and to make practical suggestions for improved measures to be adopted in regard to specific components of the power cost so as to bring down the overall costs.

(2) To organise and set up a power load survey party, and provide other necessary facilities that should function under the Department of Electrical Undertakings for assessing by standard procedure the natural load growth and the potential load development as well as its characteristics.

(3) To examine the existing tariff of electricity supply to different categories of power consumers and suggest promotional measures for economic development by rationalising the different power tariffs in relation to the characteristics of Industry and its bulk power demands.

(4) To examine the technical and financial aspects of new power projects that are to be recommended on a priority basis for early implementation so as to ensure availability of adequate power supply to meet the increasing demands of the future. Particular attention to be paid to the power shortage anticipated around 1969.

Appendix to terms of Reference

(1) (*a*) To examine the procurement methods for capital as well as maintenance equipment and consuming materials for the plant.

(*b*) To examine methods of control for Storing, Issuing and Accounting for maintenance equipment as well as consuming materials.

(*c*) To examine the work-load and efficiency of technical and non-technical staff and officers employed in the operation and maintenance of power houses, sub-stations, transmission and distribution lines and assess the essentiality of the strength.

(*d*) To examine the overall set-up of the Department of Electrical Undertakings and determine how best it can operate on more commercial lines and at the same time build up an Engineering Planning and Design Sector, so as to minimise progressively the substantial cost liability against the foreign consulting firms' services that are being obtained now.

(2) (*a*) To study the scope of the country's power land development and to work out the strength with cost, &c., of the survey party required to carry out the survey as well as the assessment and development of potential loads in the plantation, semi-urban, rural and semi-rural areas.

(*b*) To provide necessary facilities along with a supply of a pro-form a questionaire, &c, to the Department of Electrical Undertakings, to enable the latter, to supply regularly to the Department of National Planning the statistical data and information relating to the Operational and Constructional performances, so necessary for power planning.

(3) (*a*) To study the trade characteristics and the bulk power and energy requirement thereof at the present and future load levels, in respect of the six categories of consumers, viz. (i) Domestic, (ii) Industrial, (iii) Commercial, (iv) Town distribution agency, (v) Municipality and street lighting and (vi) Rural electrification group.

(*b*) To examine the power supply now in application to the foregoing 6 categories of consumers and based on the findings from the energy requirement studies, suggest what rational power tariffs in each of the 6 categories of consumers should reasonably stand.

(4) (*a*) To study the aspects of technical feasibility and financial justifications of the project reports on (i) Maskeliya Stage II, and III, (ii) Samanalawewa, (iii) Mahaweli Ganga Basin Development as submitted by the USA Engineering Consulting Firm, and also arrange to check up the basic field data brought up to date, by visits to the sites.

(*b*) To submit to the Government, on the basis of studies, recommendations indicating which one of the three projects should be undertaken for implementation on a priority basis, but the construction be suitably phased out to keep pace with the power requirement programme, while avoiding unproductive capital investment on short and long terms basis.

The report of this Committee will be submitted to the Honourable Minister of Land, Irrigation and Power during the early part of 1966.

CHAPTER VI

CEYLON ELECTRICAL DEVELOPMENT ASSOCIATION

The need for an independent organization to promote and popularise the uses of electricity was felt soon after the completion of Stage I of the Ceylon Hydro Electrical Scheme. The Department of Government Electrical Undertakings, therefore, sponsored the formation of the Ceylon Electrical Development Association in 1951 which was inaugurated by the Honourable Minister of Transport and Power.

The objectives of the Association are—

(*a*) To promote the use and demand for Electricity, Electrical Appliances and Apparatus.

(*b*) To instruct the public in the many uses of electricity and create an interest among the public in electrical matters.

(*c*) To assist members and the public in obtaining a high standard in electrical work.

(*d*) To promote the manufacture of electrical goods and appliances in Ceylon, and

(*e*) To obtain an abundant supply of electricity at a cheaper and economical rate.

The membership of the Association is open to—

(i) All electricity supply authorities operating in Ceylon.

(ii) Electrical Manufacturers' Representatives and Agents and Wholesalers

(iii) Electrical contractors and retail distributors, and

(iv) Electricity consumers and those interested in the electrical industry and its allied trades.

The management of the association is vested in a council consisting of 23 members representing diverse interests in the electricity industry. The funds of the association consists of an annual grant of Rs. 3,000 by the Central Government and the subscription collected from the members.

Development of Domestic Uses of Electricity

Demonstrations in the uses of electric cooking appliances and cooking have been a part of the activities of the association for nearly 8 years. With the assistance of the press, the CEDA was in a position to give publicity to various labour saving electric devices that were imported at that time.

With the ban on the importation of electrical domestic appliances, the publicity campaign did not receive any support. Realising the need for importation of domestic appliances the CEDA made representations to the

Honourable Minister of Trade and Commerce to relax the ban on the importation of domestic appliances and release adequate exchange to import these appliances. The Honourable Minister has acceded to the request of CEDA and has released exchange for this purpose.

The CEDA was conscious of the fact that the heavy import duty levied on electrical appliances and spares was one of the major causes for the retarded growth of electricity consumption in the domestic sector. An appeal has been made to the Honourable Minister concerned in this regard, and it is expected that redress will be forthcoming in the future.

Development of Industrial Uses of Electricity

Agro Industries such as tea, rubber and coconut does not need much persuasion to switch over to electricity and they are believed to be consuming a fair portion of the energy produced. The CEDA's attention was, therefore, directed towards popularsing the uses of electricity in rural areas for cottage industries, workshops, agriculture, and for providing environmental comforts to the rural population.

Rural income is rather low and it was found necessary to provide some assistance to them as the initial cost of wiring, &c., was above their means. The CEDA, therefore, approached the People's Bank with a request to provide loans to village co-operatives and local authorities for the specific purpose of meeting the initial cost of wiring the homes and for providing service connections to those interested in taking a supply. Under this scheme the village co-operatives will provide loans to their members for the above specific purpose and recover the loan so granted in 60 monthly instalments ; while the local authority will obtain the loan from the People's Bank and arrange for the wiring of the prospective customers houses, and provide service connections. The amount so expended by the local authority will be recovered in 60 monthly instalments and the bank loan repaid.

The CEDA in collaboration with the Small Industries Service Institute have planned to hold a series of demonstrations in rural areas in the use of electrically operated tools that could be usefully employed by the rural folks.

Adequate publicity materials, to educate the people in rural areas is a necessity if any headway is to be made in popularising the use of electricity. The CEDA has approached the Honourable Minister of Land, Irrigation and Power to use his good offices and get the Director-General of Braodcasting and Information to produce a few documentary films depicting the various uses of electricity.

The CEDA will also organise seminars on " Rural Electrification " in order to study the various problems faced by the authorites in providing supply to rural areas and the effect of rural electrification on the lives of the rural population.

It is an obvious fact that the rural population is conservative and will not give up the traditional rudimentary methods of production, until they are absolutely certain of the advantages that electrically operated machines could confer on them. This could be done best by a publicity campaign followed with demonstrations.

Presently the CEDA has neither the financial backing nor the facilities such as demonstration halls, mobile demonstration units, cinema vans, &c., at its disposal to cary out a national publicity campaign. It is, therefore, essential to provide financial assistance to this organisation so that it could usefully serve the purpose for which it was formed. It is hoped that with the expansion of the Department's rural electrification programme, adequate financial assistance will be given to CEDA to further this publicity campaign and so help the Department to supply more electrical energy to the rural areas.